Food related habits of Iranian residents in Europe

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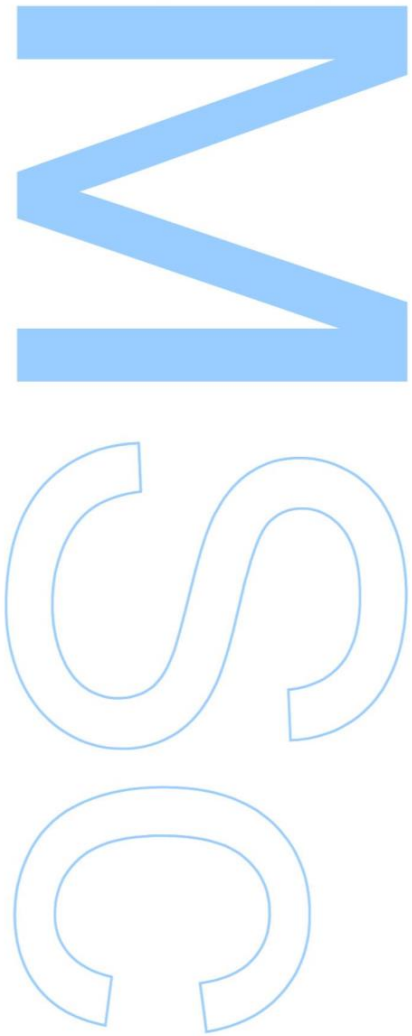

Resumo

Os hábitos alimentares e outros com eles relacionados têm um efeito decisivo na manutenção da saúde a nível individual e da comunidade. Uma ampla gama de fatores contribuem para as rápidas mudanças alimentares que ocorrem no mundo. Ambiente e cultura estão entre os determinantes mais poderosos que podem influenciar os hábitos alimentares. O impacto da imigração sobre os hábitos relacionados com alimentação é realçado porque a mudança de ambiente implica aculturação. A imigração conecta pessoas com diferentes culturas e hábitos. Muitas pessoas emigram dos seus países de origem por razões diferentes, sendo este fenómeno mais comum na atualidade. Em meados de 2015, cerca de 40% dos imigrantes originários do Irão selecionaram a Europa como destino. Determinar se os imigrantes iranianos na Europa mantiveram sua dieta tradicional ou adotaram novos padrões alimentares, bem como avaliar a influência das características demográficas, estilo de vida, estado de saúde e capacidades culinárias na adesão a uma alimentação saudável e na extensão das mudanças que ocorreram nos seus hábitos alimentares. Um questionário on-line foi publicado nos grupos de media-social de imigrantes iranianos na Europa. O questionário colheu dados sociodemográficos, de estilo de vida, de estado de saúde, de hábitos alimentares, preparação de alimentos e capacidades culinárias. A dieta mediterrânea avaliada por uma ferramenta rápida de 14 itens foi usada como proxy para um padrão alimentar saudável. As capacidades culinárias também foram avaliados por uma escala padrão. A associação entre as variáveis foi testada através de regressão logística binaria, tendo-se calculado coeficientes de β e intervalos de confiança a 95%. A amostra consistiu em 415 indivíduos com idade média de 32,6 $\pm$ 5,82 anos, 49,3% eram do sexo feminino e quase metade (49,4%) eram estudantes. O valor médio obtido na escala de capacidades culinárias foi 3,91 $\pm$ 1,22 e a pontuação média para a adesão à dieta mediterrânea foi de 6,20 $\pm$ 2,15. Os estudantes, em comparação com os indivíduos empregados, mostraram menor probabilidade de ter uma melhor adesão à dieta mediterrânica [OR: 0,48 (IC 95%: 0,24-0,96)]. Os homens e os indivíduos com doutoramento foram associados com menos mudanças nos hábitos alimentares [OR: 0,40 (95% CI: 0,17-0,93); OR: 0,12 (95% CI: 0,02-0,86)], ao passo que ser fumador revelou estar associado com maiores mudanças de hábitos alimentares [OR: 3,70 (IC 95%: 1,14-12,04)].

Conclusões: Na amostra estudada, a situação perante o emprego mostrou influência sobre a adesão a um padrão alimentar saudável O género, o nível de educação e os hábitos tabágicos influenciaram a dimensão das mudanças nos hábitos alimentares desde a migração. Por outro lado, a duração da imigração não influenciou a mudança de hábitos alimentares, embora estes imigrantes tenham mudado alguns dos seus hábitos de preparação de alimentos.

Abstract

Food related habits have a decisive effect on maintaining the health at the individual and community level. A wide range of factors are contributing to the accelerated dietary changes in the world. Environment and culture are both among the most powerful elements that can influence eating habits. The impact of immigration on food related habits is highlighted because it changes the environment and implies acculturation. Immigration connects people with different cultures and habits. It has become more common in modern age, and lots of people emigrate from their home countries for different reasons. In mid-2015, about 40% of the immigrants originating from Iran selected Europe as their destination. To determine whether the Iranian immigrants in Europe have maintained their traditional diet or adopted new dietary patterns and to assess the influence of demographic characteristics, lifestyle, health status and cooking skills on adherence to a healthy diet and the extent of changes that occurred in their eating habits. The link of an online questionnaire was posted in the social media groups of Iranian immigrants in Europe. The questionnaire collected data on sociodemographics, lifestyle and health status, food habits, food preparation and cooking skills. The Mediterranean diet that was assessed by a 14-items quick tool was used as a proxy for a healthy dietary pattern. Cooking skills were also evaluated by a standard scale. Association among variables was tested by binary logistic regression and crude and adjusted β coefficients and 95% confidence intervals were calculated. The sample consisted of 415 respondents with an average age of 32.6 $\pm$ 5.82 years, 49.3% were female and almost half of them (49.4%) were students. The average rate obtained by the scale of cooking skills was 3.91 $\pm$ 1.22 and the average score for the adherence to the Mediterranean diet was 6.20 $\pm$ 2.15. Students in comparison with employed individuals showed lower probability for having better adherence to the Mediterranean diet [OR: 0.48 (95% CI: 0.24-0.96)]. Male and individuals with PhD education were associated with less changes in the eating habits [OR: 0.40 (95%CI: 0.17-0.93); OR: 0.12 (95% CI: 0.02-0.86)], whereas being a smoker revealed to be associated with higher eating habits changes [OR: 3.70 (95% CI: 1.14-12.04)]. In the studied sample, the employment status showed influence on having a healthy diet, and gender, education and smoking habits had influence on the changes in the eating habits since migration. The duration of immigration did not influence changes in their dietary patterns toward a healthier diet, though they have changed some of their food preparation habits.

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Zahra Akhavan Tavakkoli

The food you eat can be either the safest and most powerful form of medicine or the slowest form of poison.
- Ann Wigmore

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Chapter 1

Introduction

In section 1.1, the basic factors that influence the food related habits are introduced. Different aspects of eating habits are also described in this section. In section 1.2, the main reasons for studying the food related habits is explained. The purpose of focusing on the factor of immigration and selecting the Iranian citizens living in Europe are also explained in this section. The main objectives for carrying out this research are discussed in section 1.3.

1.1 Research context

Changes in food related habits and dietary composition have been described as nutrition transition. Nutrition transition associates with changes in the foods and beverages consumed (Popkin, 2015). This emerging phenomenon is worldwide, and driven by a wide range of factors (Popkin, 2015; Garnweidner et al., 2012). Dietary changes is accelerating in the world toward a dietary pattern high in fat and added sugar (Popkin, 2001). It leads to unavoidable consequences in most cases. For instance, in some Mediterranean countries, where a gradual shift from traditional Mediterranean diet to a "westernized" diet is being experienced, the incidence and prevalence of overweight and obesity has increased in these countries (Altomare et al., 2013).

Food related habits comprise food choices, food preparation habits, cooking methods and cooking skills. A large part of the eating behaviors is habitual. Habitual behaviors are basically different from non-habitual behaviors. They are more dependent on environment and external factors and less dependent on knowledge (van't Riet et al., 2011). Habits are learned sequences of acts triggered by the environmental and cultural

factors (van't Riet et al., 2011).

Environment and culture both influence the attitudes and behaviors that shape food choices. Food choices can change by the time. For instance, since the world war II the British have altered what they eat to a remarkable degree. Now the mass market items in the British food market are foods and ingredients that were unimaginable in the past (Caraher et al., 1999).

Food preparation habits differ noticeably across the world. How often do people cook at home, the amount of time spent for preparing the meal and the person in charge of cooking in the household are the main determinants of the food preparation habits (Monsivais et al., 2014). Usually women take, or are forced to take, more responsibility for household tasks (Caraher et al., 1999). In most parts of the world, women prepare the main meal at home and they bear the burden of cooking for the household (Caraher et al., 1999; Helman, 1990). However, men's contribution to housework is not similar in all regions, and in some countries men contribute more in meal preparation and cooking. Rapid development of kitchen equipment has substantially declined the time spent for cooking.

Cooking is the art of preparing food for eating with the use of heat. Cooking methods vary widely across the world, reflecting unique environmental, economic, and cultural traditions and trends. The cooking habits are interrelated with other standardized behaviors in the same culture (Asp, 1999). Cooking methods for meats, seafood and vegetables are usually unique in each geographical region. Methods such as steaming, simmering, boiling, and poaching are considered as moist cooking methods, while the dry methods include sautèing, pan frying, and deep-frying (Baker et al., 1972). The term "cuisine" usually refers to the methods of food preparation in a specific population (Miele and Murdoch, 2002).

Cooking is an essential life skill; it is one of the essentials of bringing together a meal (Caraher et al., 1999). Cooking skills are determined by evaluating the knowledge and the experience required for preparing a meal (Gatley et al., 2014). People with higher cooking skills are less reliant on convenience foods, which may be highly processed, high in fat, sugar and salt (Gatley et al., 2014). Cooking skills give people more autonomy over the foods they eat (Gatley et al., 2014). It can help people to meet nutrition guidelines in their daily nutrition supply and allows them to take healthier food decisions (Hartmann et al., 2013). Differences in the cooking skills can be a contributing factor to health differences (Caraher et al., 1999).

The traditional definition of cooking skills is to take the basic raw ingredients and

turn them into complete culturally appropriate dishes (Lang and Caraher, 2001). Convenience foods, value-added foods, microwave foods and the commercially prepared foods are changing the traditional concept of cooking skills. The differences between cooking from the basic ingredients and cooking from the ready-prepared foods should be taken into account.

Decline in cooking skills may lead to low quality dietary pattern and obesity (Hartmann et al., 2013). Lacking of cooking skills is not just a problem of the modern life, it is known as one of the reasons for unhealthy eating behaviors. There are several reasons for decline in the cooking skills. The deficiency in the transmission of cooking skills at home from parents to children is one reason for the decline in the cooking skills. Another reason is the sense of time scarcity, which has covered all our lives in modern life (Hartmann et al., 2013). Food technologies have appeared as a response to this limitation. It have also helped people to easily access the convenience ready-to-eat foods, which makes them free from cooking (Hartmann et al., 2013). It seems that the role of mothers in transmitting the cooking skills to their children is more important than the other factors, such as schools and cookery books (Harmon et al., 2015).

The food related habits in each geographical region are strongly linked to the environmental and socio-economic conditions, as well as the culture. The food systems and human diets have been shaped by the cultural factors and the environmental conditions, such as climate, location and terrain during thousands of years (Ogce et al., 2008). They also greatly depend on the available food products, cultural needs and the preferences of the society (Gatley et al., 2014).

Many factors play role in shaping the food related habits. The food related habits are influenced by culture, customs, climate, economic conditions, the foods available in the region, geography and the ecosystem (Gatley et al., 2014). The plants and the animals that exist in the region can also determine the eating patterns of people.

Although culture seems to be static and unchanging, in reality it is continually changing with other socioeconomic conditions. Food related habits of a group of people that live in a certain geographical region can also change by time, because of the changes that occur in the environmental and cultural conditions(Asp, 1999).

In ancient societies, where people did not have the possibility to trade with other regions, the environment and the geography of the region limited them in obtaining different types of foods. The primary ways used by people in ancient societies to obtain food were: hunting and fishing, gathering, farming and raising domesticated animals. Gathering is a general term referring to collecting the foods that grow wild

in the environment (Native Languages of the Americas Corporation, 2015). During thousands of years, this limitation was reflected in the eating behaviors of people. This is the reason why residents of a dessert do not eat as the residents of a coastal area.

The culture and the cuisines of a region are significantly influenced by the geography of that region. For example, Greece as a rocky, mountainous country surrounded by sea in three sides of the country did not have enough flat or fertile land to farm. They were not able to grow enough grain to feed themselves. In this situation, they had three options: 1) trade, 2) colonize or 3) conquer. They did all three and traded staple crops, olive oil and wine. Greeks found colonies like Sicily to produce grain (White, 1961).

Lifestyle and culture are among the most important factors that influence food decisions made by individuals. It is believed that culture determines the specific attitudes and behaviors of a nation or a group of people, especially those in the food domain (Cervellon and Dubé, 2005). The cultural attitudes may also determine where and with whom the food is eaten (Airhihenbuwa et al., 1996). In some cultures, special foods and tastes are used to preserve a tradition or to maintain the identity of a group of people (Airhihenbuwa et al., 1996). In many cultures, offering food represents the sociability and hospitality of people. Eating behaviors of people around the world can represent their culture. This is the reason why countries with similar cultural sources usually have high similarities in their eating behaviors. Similarities in the cultural sources refers to having the same religion, similar language or the historical relationships.

Classification of edible foods also varies between different populations. There are foods that are not considered edible by a population but used by another one. Furthermore, the way that they process or cook the food may influence the edibility from the perspective of a certain population. Some fruits or vegetables are consumed raw in some populations, but for other groups it is not acceptable to eat those in that form (Asp, 1999). The religious beliefs may prohibit some foods or have some food taboos (Asp, 1999). There is a set of implicit rules in each culture that determines the order of the dishes within a meal, who prepares the meal, and the manner of eating the food (Helman, 1990).

The acculturation process is an important fact that should be taken into account with its impact on eating behaviors. Acculturation is the process of cultural and psychological change as a result of meeting between different cultures (Sam and Berry, 2010). Lengthy contacts between groups of people with different cultures is not a rare

phenomenon. Influencing the culture, cuisines, customs and eating behaviors are some results of this contact. The socio-cultural environment of immigrants changes after residing in a new country, which usually results in various changes in socio-economic status, work status, access to health care and life style, including dietary pattern and physical activity, and finally the health status of the immigrant (Wandel et al., 2008).

Migration is recognized as one of the most important determinants of dietary changes. The minority group adopts the food related habits of the host countries. This process is also known as dietary acculturation (Vilela et al., 2014). The immigrants find a new way to use their traditional foods, exclude some foods and start using new foods. Dietary acculturation may lead immigrants to alter their food related habits, which include their beliefs, attitudes and behaviors related to food purchasing, preparation, and taste preferences (Hassan et al., 2012). The values and food traditions of immigrants are challenged by food norms, food accessibility and economic conditions in the new country (Wandel et al., 2008).

Positive relationship between nutrition knowledge and eating behavior is reported by Pirouznia (2001a). High levels of nutrition knowledge have been demonstrated to have significant direct association with greater adherence to healthy eating style (i.e. Mediterranean diet) (Pirouznia, 2001a). The perception of the importance of nutrition has a very strong influence on the quality of the meals in terms of the health factors. Those with more knowledge about nutrition select healthier food choices, spend more time on cooking, employ healthy cooking methods and try to improve their cooking skills (Salehi et al., 2015).

On the other hand, the fact that human behaviors are much more complex should be taken into consideration. We may easily equal knowledge to behavior, however, knowledge does not always imply a behavior. Most of the times, it is in fact a very minor factor in behavior change. Knowledge is often not the main factor affecting changes in behavior (Fiore et al., 2015). Pirouznia (2001b) did not find a significant relationship between nutrition knowledge and eating behavior for sixth grade students, though there were relationships between knowledge and eating behavior for the students in seventh and eighth grade. Social cognitive theories are often insufficient to explain or address why knowledge is not turned into action (Fiore et al., 2015). Eating behaviors also change by the age (Wakimoto and Block, 2001). Dietary patterns of the elderly people are different from the middle age people or adolescents. Changes in the household economy also alter the way that people eat and their food choices (Wakimoto and Block, 2001).

1.2 Motivation

Food related habits have a decisive effect on health. They have a key role in maintaining health at both individual and community levels (Patino-Alonso et al., 2014). Some dietary patterns are considered as healthy eating models, while others are qualified as unhealthy. The recent studies have confirmed that the occurrence of some cancer types are increasing in definite geographical regions. These cancers are largely preventable by changing some factors, such as food choices and dietary patterns. A large proportion of non-communicable diseases can be prevented by following appropriate diets and lifestyles (Ogce et al., 2008).

Unhealthy and bad dietary patterns can cause obesity. Obesity is also the reason for some serious diseases, including cardiovascular diseases, hypertension and stroke, diabetes mellitus, and several forms of cancer (Stroebele and De Castro, 2004).

The healthy dietary habits are shaped by the influential factors mentioned in the previous section. Figure 1.1 shows the relationship between influential factors, food related habits and health status (Dahlgren and Whitehead, 1991; Salehi et al., 2015; Contento, 2007). To adopt healthy eating habits, it is essential to be aware of triggers or cues that cause a group of people to make unhealthy food decisions. Changes in eating behaviors toward healthy patterns are desirable only if the results remain in long-term. Some eating and cooking habits are outside of people's conscious and awareness, and therefore the educational approach has less effect in changing these habitual behaviors (van't Riet et al., 2011). Thus, investigating the influential factors is very important for policy makers and health care providers that intend to establish healthy dietary patterns and launch intervention development schemes.

The cultural and environmental factors influence the average time that people spend for preparing the meals. Monsivais et al. (2014) have reported the association between the time spent on home food preparation with indicators of higher diet quality, including more frequent intake of vegetables, salads, fruits and fruit juices. The findings indicate that the time can be an essential ingredient in the production of healthier eating habits (Monsivais et al., 2014).

Cooking is a health-relevant skill, and it has a direct relationship with health status by helping people to widen their food choices (Caraher et al., 1999). The practical application of everyday food preparation habits plays a significant role in improving health (Lang and Caraher, 2001) .

Cooking methods and food choices are the other elements that play important roles

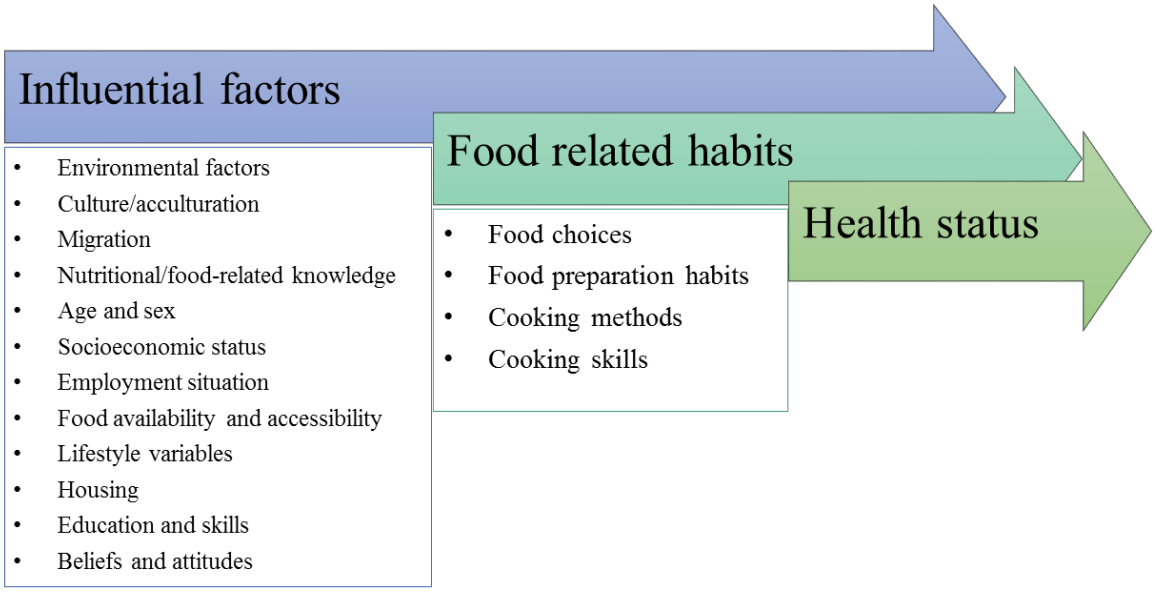

Figure 1.1: Impact of influential factors on food related habits and health status.

in providing healthy meals. The unwillingness to cook meals at home is a subject of an academic debate. Individualized eating habits are replacing the traditional home cooking for the family. The impact of this trend on the public health issues has attracted special attention of the policy makers (Gatley et al., 2014).

Healthy dietary patterns have many food choices in common. They include fruits, vegetables, fish and whole grains, and limit unhealthy fats. However, another important parameter that highlights the differences among healthy dietary patterns is the proportions of certain foods.

The Mediterranean diet is usually known as an eating pattern that can help to promote health, prevent disease and reduce the risk of death from heart disease and cancer. The success of the Mediterranean diet is in its composition (Altomare et al., 2013). It has been demonstrated to have a beneficial influence on health and longevity, while offering cuisines that are rich in colors and aromas (Altomare et al., 2013), (Sofi et al., 2014). The main protective reasons of the Mediterranean diet are the high consumption of fiber, high intake of vegetables fat, low intake of trans fatty acids, and balanced consumption of alcohol (Martínez-González, 2008).

Despite the relatively high fat intake in Mediterranean diet, the ratio of mono-unsaturated fatty acids to saturated fatty acids is high, due to the abundant use of olive oil (Martínez-González, 2008). Diets that are rich in monounsaturated fatty acids can

improve the lipid profiles and glycemic control in people with diabetes (Martínez-González, 2008).

Therefore, due to the health consequences of food related habits, any factor that can potentially influence them should be thoroughly investigated. Immigration is connecting people with different cultures and habits. In the previous section, immigration was introduced as one of the factors that influence food related habits. As a result of modern age, immigration is getting easier and more common. People migrate from their countries for different reasons, mainly to find better opportunities and achieve higher life quality. In this period of globalization, higher education in many countries is internationalized and students have also joined to the category of immigrants. In other words, education is now a strong stimulus for immigration.

Many aspects of the immigrant's life changes significantly after residing in the host country, and the changes become more considerable with time. Changes in food related habits and acculturation phenomenon are easily noticeable in immigrants. This situation has attracted the interest of nutritionists. Understanding the impacts of immigration on food related habits can provide several benefits. It can guide nutritionists in developing effective nutrition intervention to change the eating behaviors toward healthy eating patterns. It also shows how immigrants are integrating into the society of the host country (Serafica, 2011).

Europe and North American countries are the main destinations of immigration for the immigrants of the Asian countries with increasing population. Iran's population has increased dramatically during the second half of the 20th century, reaching about 79 million by 2015, and therefore a high percentage of this population are young generation who search for a better life, wherever they find (Nations, 2015). Iran is a country with high number of immigrants. There are about four to five million Iranians living abroad. Taking into account that many of these immigrants are students, who have left the country during the past decade to study in postgraduate degrees in Europe and the fact that these group of immigrants are easily accessible through the social networks and contacts provided by internet, the Iranian immigrants are chosen for this study.

An advantage of this study population is that we can evaluate the food related habits of a population of young people with autonomous families that have food choices which no more directly depend on the food choices of their parents. In other words, it is reasonable to assume that for many of these participants, if they were living in Iran, their food choices were not independent from their parents. They would have been

living with their parents. Thus, this study population provides a great advantage for studying the food choices of young generation who are independent from the decisions of their previous generations.

1.3 Objectives

This research aims to study the food related habits of Iranian citizens in Europe to determine whether they have maintained their traditional diet after immigration or adopted new dietary habits. The eating habits and the food preparation habits of the respondents was assessed. The main objective was to evaluate the influence of demographic characteristics, lifestyle, health status and cooking skills on adherence to a healthy diet and the changes that have been made in their eating habits since migration. Mediterranean diet is used as a proxy for a healthy diet.

Chapter 2

Review of the literature

The related work is reviewed in this chapter. First, the literature on changes in food related habits in general and the reasons of these changes is reviewed in section 2.1. In section 2.2, the focus of literature review is on the changes that have occurred as a result of immigration. The literature that have studied the adherence to the Mediterranean diet and have evaluated the level of cooking skills of a population are respectively reviewed in sections 2.3 and 2.4.

2.1 Food related habits

Changes in food related habits that occur by external factors or by time have been widely studied by many researchers. Stroebele and De Castro (2004) suggest that there are major influences of ambiance on eating behavior. They have summarized the research on ambient influences on food intake and food choices. The impact of environmental factors, including the social variability and general surroundings, are examined. Findings of this research demonstrate that the ambiance strongly influences the eating habits. Verstraeten et al. (2014) identified the factors influencing eating behavior of Ecuadorian adolescents. Habit strength, financial autonomy and taste preferences were among the key individual factors in Ecuadorian adolescents' food choices.

Alibabić et al. (2012) investigated the traditional Bosnian foods and cooking habits in Bosnia by collecting data from the surveys. People over the age of 70 were questioned about the type of the foods in the past and the food preparation processes. The results of this investigation show that the Bosnians in the past had been consuming the same

ingredients as in the today's society with much easier and simpler cooking methods.

Caraher et al. (1999) explored the impact of income, social class, gender and age on differences in domestic cooking skills by using the data from 1993 Health and Lifestyles Survey of England. They suggested that the socio-economic status and education are associated with the sources of people's knowledge about cooking. Mothers were reported to be the most important source for transferring the cooking skills in all social classes.

Casini et al. (2013) identified the future trends in food habits by comparing the food choices made in Italy by Generation X in the year 2000 with those of Generation Y in year 2009. The results demonstrate that the out-of-the-home consumption become established among singles. There is also an increase of easy to prepare and ready to eat products, especially among the young people with children and from the Northern Italy. The limited available time for cooking and time pressures has also led to higher consumption of convenience foods for low- and middle-income households in U.S. (Monsivais et al., 2014).

2.2 Impact of immigration on food related habits

Sharma et al. (1999) conducted a study among African-Caribbean in United Kingdom. They reported higher energy intake from total and saturated fat in the second generation of African-Caribbean immigrants, compared to the first generation.

Changes in food habits after migration among South Asians settled in Oslo, Norway is studied by Wandel et al. (2008). A majority of the Sri Lankans have increased consumption of meat, milk, butter, margarine and potatoes. Around half of those from Pakistan reported increased consumption of oil, meat, fish and potatoes. Both citizens of Pakistan and Sri Lanka reported a decrease in bean and lentil consumption (Wandel et al., 2008).

Ayala et al. (2008) performed a systematic review assessing the relationship between acculturation and changes in the dietary pattern of the Latinos in United States. They examined the extent to which various measures of acculturation associates with dietary behaviors and the intake of macro-nutrients and micro-nutrients.

Garnweidner et al. (2012) explored the perception of the host country's food culture among female immigrants from Africa and Asia residing in areas of Oslo. The purpose of this study was to identify the aspects of the food culture that is considered important

for them to preserve, and to demonstrate their efforts in preserving these food cultures. The participants in the survey emphasized on preserving some aspects of their food related habits, such as taste, preparation method and adherence to the dietary rules of their religion.

Hassan et al. (2012) explored the eating habits of Arab immigrants to determine whether they have kept their traditional diet or have consumed a more Westernized diet since immigrating to Canada. Typically, the diets in Western countries are high in animal products, fat, sugar, and the diets in developing countries are based on one or two starchy staple foods, low intakes of animal products, fat and sugar (Ogce et al., 2008). They found that the Arab immigrants are consuming a mixture of both Arabic and Western food. The respondents perceived to have a healthier diet than before immigration to Canada. Factors that influenced their food choices included nutrition health awareness, differences in food preferences and preparation methods, and preservation of dietary practices in the new environment (Hassan et al., 2012).

The effects of short- and long-term migration on eating habits of Portuguese university students from several universities in London is studied by Vilela et al. (2014). They found that the students living in London for a longer time show more dietary changes and they seem to be more acculturated than the students living in London for a short period. In this study, the sex of the respondents is not taken into account. Another study for the same sample of Portuguese university students in London observed a shift from a Mediterranean diet towards a more Western diet after migration (Santos et al., 2015). Men were more likely to change their dietary habits, whereas women were more likely to maintain.

2.3 Mediterranean diet adherence

Investigators have attempted to identify dietary patterns associated with increased longevity for many years (Trichopoulou et al., 2003). The diets consumed by the Mediterranean population have attracted the interest of nutritionists, due to the observations that adults who live near the Mediterranean Sea have one of the lowest incidences in chronic diseases in the world and one of the highest life expectancies (Bach et al., 2006). People in Mediterranean regions substantially share a diet based on olives, olive oil, fruit, vegetables, fish, seafood, pulses and cereals (Fiore et al., 2015). Diet indexes that attempt to make a global evaluation of the quality of the diet based on a traditional Mediterranean reference diet were reviewed by Bach et al.

(2006). The Mediterranean diet indexes represent the diet with a single score, obtained from a function of different components, such as food, food groups or a combination of foods and nutrients (Bach et al., 2006).

Lower obesity risk does not only associate with the total caloric intake. Better quality of the dietary intake, for instance the adherence to the Mediterranean diet, influences the risk of obesity. The overall quality of a dietary pattern seems to affect the obesity risk to a greater extent than relative macro-nutrient quantity (Martínez-González et al., 2012).

Many studies have proved that following an overall pattern of Mediterranean diet can prevent cardiovascular disease. Martínez-González (2008) suggested that protection against diabetes can also be obtained with the traditional Mediterranean diet. They assessed the relation between adherence to a Mediterranean diet and the risk of having diabetes among initially healthy participants. A validated 136 item FFQ is used in this study to measure the entire diet of 13,380 Spanish university graduates (Martínez-González, 2008). An index with the following 8 components was used to define Mediterranean diet: high ratio of mono-unsaturated, saturated fatty acids, moderated intake of alcohol, high intake of legumes, high intake of grains, high intake of fruits and nuts, high intake of vegetables, low intake of meat and meat products, and moderate intake of milk and dairy products.

For many years, the adherence to the Mediterranean diet was mainly assessed with a full-length food frequency questionnaire (FFQ) usually with ≥ 100, 24-hour recalls or other time-consuming methods (Martínez-González et al., 2012). Trichopoulou et al. (2003) assessed the adherence to the traditional Mediterranean diet through a population-based investigation, involving 22,043 adults in Greece. The usual dietary intake was assessed with the use of a semi quantitative FFQ, including approximately 150 foods and beverages that are commonly consumed in Greece. Proportional hazards regression is used in this study to assess the relation between adherence to the Mediterranean diet and total mortality, as well as mortality due to coronary heart disease and mortality due to cancer. As a result, greater adherence to the traditional Mediterranean diet is associated with a significant reduction in total mortality.

The adherence to Mediterranean diet and nutrient intakes in a population of Sicily, Italy is assessed by Altomare et al. (2013). The nutrient intakes of 3,090 randomly selected adults were assessed through the 24h recall of dietary intake (Altomare et al., 2013). A slightly modified version of a semi-quantitative FFQ is used, and the results show that the rural participants were more adherent to the Mediterranean diet than

their urban counterparts (Altomare et al., 2013).

Although the full-length FFQ is the most-used method of estimating an individual's adherence to the Mediterranean diet, it is time consuming for participants and not an optimal choice in many surveys (Schröder et al., 2011).

The need for a brief tool that assesses only a small number of foods measured in servings per day or per week was felt by many dietitians to provide immediate feedback to participants and to establish negotiated changes with them in order to improve their dietary quality (Martínez-González et al., 2012). The 14-item Mediterranean diet assessment tool proposed in Martínez-González et al. (2012) was a response to this need. The dietary habits of 7,447 participants free of cardiovascular diseases, but with either type 2 diabetes or ≥ 3 cardiovascular risk factors were assessed by trained dietitians with the 14-item questionnaire and a full-length validated 137-item FFQ by Martínez-González et al. (2012). Strong inverse linear associations between the 14-item tool and all adiposity indexes were found. The brief 14-item tool was able to capture a strong monotonic inverse association between adherence to the Mediterranean diet and obesity indexes in a population of adults at high cardiovascular risk (Martínez-González et al., 2012).

The adherence to the Mediterranean diet among 1038 medical students was evaluated by Fiore et al. (2015). The results show that more than 70% of students know very little about healthy heating and the Mediterranean diet.

A cross-sectional study in an established cohort of 1,553 healthy participants was carried out by Patino-Alonso et al. (2014) to analyze the variables associated with adherence to the Mediterranean diet in the adult population. The evaluations are based on a 14-item questionnaire and the Mediterranean diet adherence screener, which defines adequate adherence as a score of ≥ 9 (Patino-Alonso et al., 2014). The results show that the adherence was lower among individuals younger than 49 years old. The logistic regression analysis revealed that the following factors associate with improved Mediterranean diet adherence: more physical exercise, older age, and moderate alcohol consumption. Results also indicate that the younger individuals are less adherent to the Mediterranean diet. Therefore, they could benefit most from a diet targeted to prevent cardiovascular disease in long-term.

2.4 Cooking skills

The impact of cooking skills on health has been widely investigated in the literature. Association between cooking behavior and long-term survival among elderly Taiwanese population is investigated in Chen et al. (2012) with a 10-year follow-up. They found that those who cook more frequently have a better diet and more favorable nutrient densities. The results of this investigation proved that the elders who cook with moderate frequency have a lower risk of mortality, which probably relates to both better food choices and health. Aranceta (2003) believed that the participation of all family members in buying food, preparing food and planning the family meals is required for healthy family meals. In addition to these conditions, the time available for food preparation and eating it and cooking skills are the other two variables that influence the healthy family meals. Cooking styles are changing in modern societies, where people are loosing cooking skills and no more show interest in food preparation and traditional cooking methods or low-fat cooking. Instead of traditional cooking, they are getting used to "food warming" and "fast-food preparation", which contributes to highly energy dense dietary patterns with poor content in regulatory elements and fiber (Aranceta, 2003).

Krešić et al. (2009) examined the relationship between nutrition knowledge and dietary intakes among Croatian university students. The students were requested to answer a validated general nutrition knowledge questionnaire and to respond to a FFQ. The findings indicated that those who prepare food for themselves (self-cooking *vs.* going to restaurants) have higher nutrition knowledge scores. Erlich et al. (2012) believed that cooking is an important part of a healthy lifestyle, and decline in cooking skills will lead to loss of basic domestic skills that give people control over individual and household food supply, a loss of knowledge of ingredients and their use. Short (2003) revealed that the capacity for maintaining a healthful diet by following dietary recommendations may be related to cooking skill.

Hartmann et al. (2013) developed a scale to evaluate the cooking skills in a European adult population. The relationship between cooking skills and the frequency of consumption of various food groups were examined. The results showed positive correlation between cooking skills and the weekly vegetable consumption, but negative correlation with the weekly convenience food consumption frequency.

Van der Horst et al. (2011) examined whether demographic factors, overweight, beliefs about the nutritional value and taste of ready meals and cooking skills are associated with ready-meal consumption. They found association between ready-meal

consumption and overweight. They used a 7 item scale, which had 6 items similar to what Hartmann et al. (2013) had proposed. Their results suggest that interventions targeting cooking skills might be an effective strategy to promote healthy eating.

The cooking habits and skills of a sample of Portuguese adolescents and their relation to Mediterranean diet adherence was assessed by da Rocha Leal et al. (2011), where 390 adolescents from the seventh, eighth and ninth grades in a school from a semi-urban region in northern Portugal were asked to fill in the questionnaire. The KIDMED index was used to evaluate adherence to the Mediterranean diet. The questionnaire also focused on the self-reported cooking skills of the respondents. The results of this research showed that better cooking habits and skills was positively related with adolescents adherence to the Mediterranean diet, which reinforces the idea that teaching cooking skills may have a positive impact on future food choices (da Rocha Leal et al., 2011).

Barton et al. (2011) proposed a questionnaire tool to assess the impact of cooking skills interventions. The content validity was evaluated by public health experts and face validity was assessed by individuals, typical of those who may attend cooking skills classes.

Chapter 3

Methodology

This chapter introduces the research design, the target population, the procedures used to recruit the sample, the use of instruments to collect information, scales used to evaluate the adherence to the Mediterranean diet and the level of cooking skills, and the statistical techniques that were used in the research. In section 3.1, the study population is introduced. The settings of the survey in social media is explained in section 3.2. In section 3.3, the data that is collected in the survey is explained. The assessment tool for adherence to the Mediterranean diet and the scale used for measuring the level of cooking skills is presented in this section. The procedure of the statistical analysis is presented in section 3.4.

3.1 Study population and sample

The study population consist of Iranian residents in Europe. Figure 3.1 shows the destination countries that migrants originating from Iran have selected. This figure shows that Europe is one of the main destinations for Iranian immigrants. Based on the statistics of United Nations (population division) (UN, 2015) in mid-2015, the international migrant population originating from Iran was 1,123,383 and Iran ranked 54^{th} in sending migrants in the world. Iran also ranked 19^{th} in the world as a destination country for migrants with 2,726,420 migrants originating from other countries living in Iran (UN, 2015).

According to the United Nations statistics in year 2015, 451,247 Iranian immigrants were living in Europe (UN, 2015). Figure 3.2 shows the distribution of Iranian immigrants divided on 4 EU sub regions (UN, 2015).

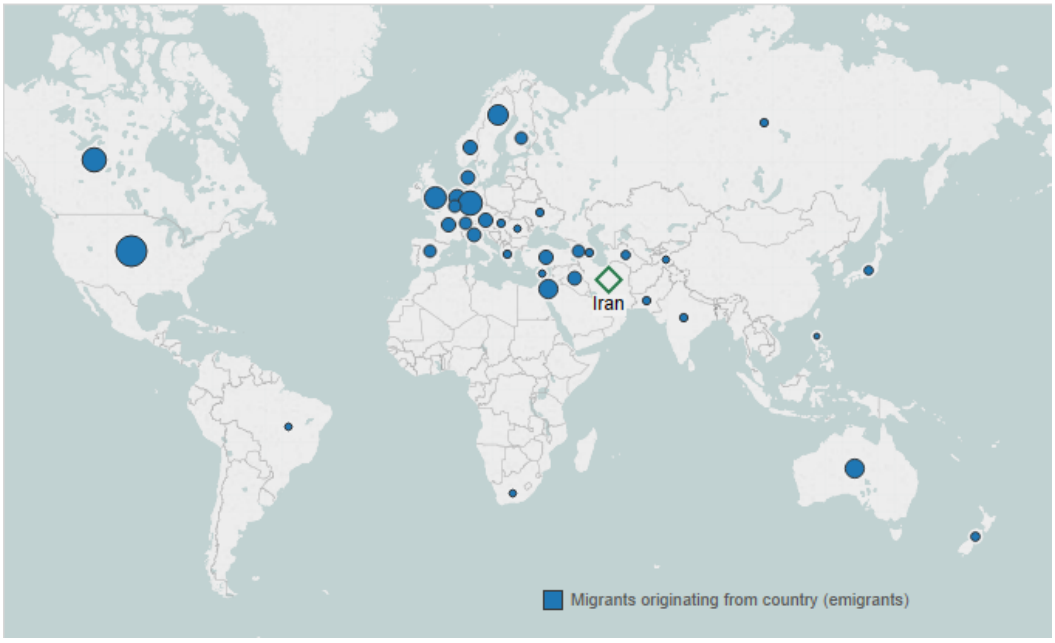

Figure 3.1: Migrants originating from Iran, mid-2015 estimates (MPI, 2015).

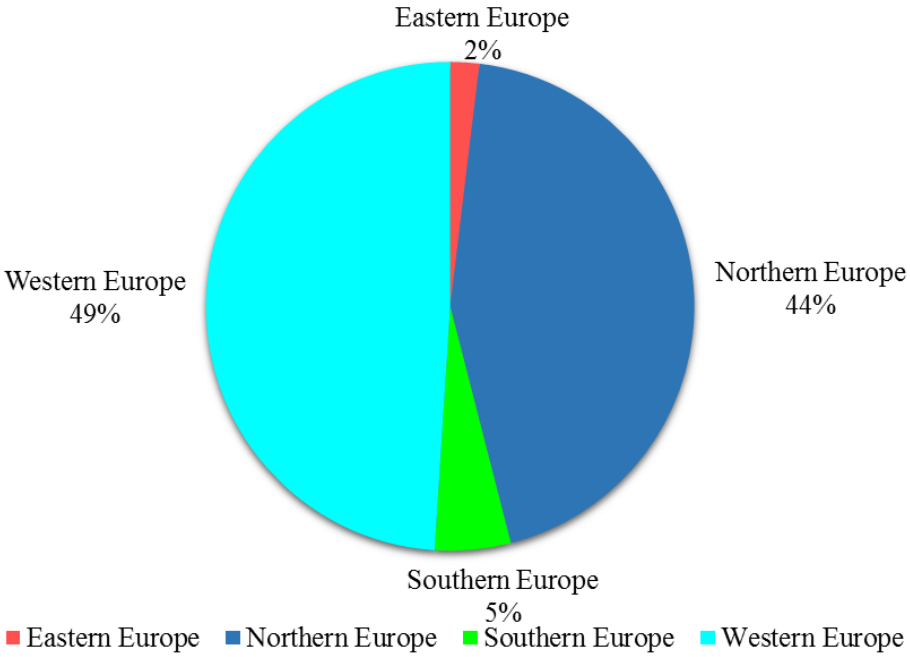

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Figure 3.2: Percentage of Iranian immigrants in each EU sub region (UN, 2015).

Iranian immigrants in Europe were invited to participate in this study trough social networks, and thus this research was based on a convenience sample. To recruit the participants, announcements were made in Facebook groups related to Iranian immigrants in Europe.

3.2 Design and settings

Data collection was obtained through a questionnaire and was performed from March to May 2016. The questionnaire was shared in social networks during this period. In the first step, a request was sent to several public and closed groups in Facebook that belonged to different categories of the Iranian residents in Europe. These groups are formed to facilitate the life of students and residents in European countries and to share common interests of the group members. The majority of these groups are managed by Iranian students, others are mainly focused on buying and selling goods in the local area of the group members. After being accepted in these groups, the link of the questionnaire with a brief description of the project was shared in these pages. In this situation, there was also the possibility of receiving feedbacks from group members in the form of comments below my post. The link was at least shared twice in each of these pages. The questionnaires link was opened by 712 people who saw our request in the social network, but from those only 415 participants submitted their response. The questionnaire was only considered as completed when the participant submits its answers, even if some questions have left unanswered.

Social networks offer novel communicative possibilities, and can be used to collect data in surveys. The main advantages of using social media for collecting data in surveys is obtaining quick accurate valuable results at lower costs.

3.3 Data collections tools

An online questionnaire was designed very carefully to collect the needed information. A well-designed questionnaire ensures that we obtain valid responses for the questions of the research.

The questionnaire was developed in *LimeSurvey*, a free and open source on-line survey application that allowed its easy sharing through social networks. The questionnaire mainly consisted of closed questions that some times also allowed for open replies.

The questionnaire was pretested with six volunteer Iranian students in Europe. The average time for responding the questionnaire was 15 minutes. They found questions understandable and straightforward. One of the respondents reported that the servings of olive oil were missed in the food habits section in the first version of the questionnaire. Another confusion for some of the respondents was the way they were

asked for their age. They did not know whether to enter their age or their birth year. Both these confusions were cleared up in the final version of the questionnaire.

The questionnaire contained three main parts: personal data of the respondents, their lifestyle and health status, food habits and food preparation and cooking skills. The full questionnaire is presented in appendix A.

3.3.1 Sociodemographic data

The personal data included gender, age, city of residence, immigration time, their intention to spend the future years in abroad, education, employment situation, marital status, residence type and the household composition. The immigration time is assessed with two values. First, the number of years and months that they are living in the country of current residence. Next, the number of years and months that they are living out of Iran. Their intention and interest toward spending the next year in the country of current residence is evaluated with a 5 points scale, where 1 denotes "not at all" and 5 refers to "certainly yes".

Education was assessed by the completed degree that they had at the moment of responding to the questionnaire. The following categories were considered for education levels: primary school, secondary school, bachelor, master and PhD. Employment status was categorized into 5 groups: employed, unemployed, housekeeper, student, retired. The marital status at the time of responding was categorized to 4 options: single, married, divorced/separated and widowed.

The housing situation was also categorized into 5 groups: entire house/apartment (rented or purchase), shared house or rented room, student residence, parental housing, house of other family members.

The respondent also had the option of "other" in some questions to better describe their sociodemographic status, when none of the groups fitted their situation.

3.3.2 Lifestyles and health status

The number of days that the respondent had some sort of physical activity was asked, before and after immigration. With regard to smoking habits, the study participants were classified to non-smokers, former smokers and smokers.

The chronic diseases that they were currently suffering from was asked, as well as

the changes of their health status since migration. They were questioned in the next step to indicate the degree that they think the new food habits have influenced their health status. The body mass index (BMI) (calculated as weight $(kg)/height(m)^2$) for each participant could be calculated from their actual height and weight that were requested together with the changes in their weight since migration. The standard BMI categories of the World Health Organization (WHO) and the National Heart, Lung and Blood Institute (Bethesda, Maryland) is used in this research. In this standard classification, those with BMI less that 18.5 are underweight, those with BMI 18.5-24.9 are normal weight, those with BMI 25.01-29.9 are overweight, and finally those with BMI higher than 30 are obese (Flegal et al., 2014).

3.3.3 Food habits

Some general information, regarding to the food habits of the respondents was obtained in this part of the questionnaire. The frequency of consuming each meal (i.e. breakfast, morning snack, lunch, afternoon snack, dinner and night snack) during a typical week was asked. They were able to insert the frequency before and after the immigration.

They could show how their eating habits have changed since migration with a 5 points scale. Next, the level of the changes since migration in each of the following eating habits was asked with a 5 points scale where 1 refers to "no change" and 5 refers to "lots of change": meal number, mealtimes, place of eating, type of food and amount of food. In the aforementioned eating habits, it would be beneficial to understand the type of changes for meal number and amount of food. Therefore, in the next question, the respondent could clarify whether the changes were upward or downward or if the habit has not significantly changed since migration. Their attitudes and interests toward Iranian cuisine were questioned from the Iranian immigrants to see if they had not missed their traditional cuisines/dishes or missed a lot.

After this general questions about the food habits, the questions regarding the adherence to the Mediterranean diet were asked. The adherence of the dietary pattern of the respondents to the Mediterranean diet, taken as a proxy for a healthy dietary pattern, was assessed by incorporating the validated 14-item questionnaire of Mediterranean diet adherence in the food related habits questionnaire (Martínez-González et al., 2012).

A brief 14-items tool was required in this research, instead of full-length comprehensive methods to capture the adherence to the Mediterranean diet of the respondents after

the immigration. The 14-item Mediterranean diet assessment tool was developed by PREDIMED study group (Martínez-González et al., 2012). The baseline 14-item questionnaire, which was the primary measure used in this study to appraise adherence of participants to the Mediterranean diet is shown in Table 3.1. Each question in Table 3.1 is scored 0 or 1 according to the shown criteria. Summation of the points in each item gives the total score for each respondent varying from 0 to 14. Higher scores refer to higher adherence to the Mediterranean diet.

Table 3.1: 14-item Questionnaire of Mediterranean diet adherence (Martínez-González et al., 2012).

Questions	**Criteria for 1 point**
1. Do you use olive oil as main culinary fat?	Yes
2. How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.)?	≥4 tbsp
3. How many vegetable servings do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	≥ 2 (≥1 portion raw or as a salad)
4. How many fruit units (including natural fruit juices) do you consume per day?	≥3
5. How many servings of red meat, hamburger, or meat products (ham, sausage, etc.) do you consume per day? (1 serving: 100-150 g)	<1
6. How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	<1
7. How many sweet or carbonated beverages do you drink per day?	<1
8. How much wine do you drink per week?	≥7 glasses
9. How many servings of legumes do you consume per week? (1 serving: 150 g)	≥3
10. How many servings of fish or shellfish do you consume per week? (1 serving 100-150 g of fish or 4-5 units or 200 g of shellfish)	≥3
11. How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard?	<3
12. How many servings of nuts (including peanuts) do you consume per week? (1 serving 30 g)	≥3
13. Do you preferentially consume chicken, turkey, or rabbit meat instead of veal, pork, hamburger, or sausage?	Yes
14. How many times per week do you consume vegetables, pasta, rice, or other dishes seasoned with sofrito (sauce made with tomato and onion, leek, or garlic and simmered with olive oil)?	≥ 2

3.3.4 Food preparation and cooking skills

In this section, 7 questions have been asked from the participants to evaluate their cooking skills. The scale that we used for this part is the standard scale introduced by Hartmann et al. (2013). In addition to questions that determine the cooking skills of the participants, they were asked about how often they cook before and after the immigration and also how often they do shopping for food needs in these two periods. They could also determine one most relevant source for learning how to cook.

It is assumed that a decline in cooking skills can lead to inadequate diet quality. A key problem in evaluating cooking skills studies is the lack of reliable, universally applicable cooking skills measurement (Hartmann et al., 2013). This cooking skills

scale is a reliable and consistent instrument to measure cooking skills. This scale is suitable for the European cultural region, and it has been validated using a test-retest analysis (Hartmann et al., 2013).

Based on the items introduced by Hartmann et al. (2013) the following 7 questions were asked from the respondents, requesting them to self-evaluate their own cooking skills on a six-point agreement scale, which 1 means do not agree to and 6 means totally agree:

- I consider my cooking skills as sufficient.
- I am able to prepare a hot meal without a recipe.
- I am able to prepare gratin.
- I am able to prepare soup.
- I am able to prepare sauce.
- I am able to bake cake.
- I am able to bake bread.

Based on the response of each respondent to these questions, mean values are calculated to exhibit the cooking skill level of each participant. The total score may vary from 1 to 6 and higher values correspond to better cooking skills.

3.4 Statistical analysis

The data were exported from *LimeSurvey* to *IBM SPSS Statistics* 24. All the variables were transcribed into the data editor of SPSS and defined as nominal, ordinal or scale. After exporting the data to SPSS, the value labels were modified to be more clear and understandable.

For each variable, the number of valid observations and the percentage was calculated. The arithmetic mean and the standard deviation of the cooking skills scale and Mediterranean diet adherence for each individual was obtained. Demographic variables, lifestyle variables and health status were also shown. For nominal variables, the absolute and relative frequency were calculated and for the ordinal or scale variables the mean and standard deviation was calculated.

In order to find the relationship between the total cooking skills score and the respondents' description about their cooking skills and their agreement with considering their cooking skills sufficient, the Spearman's correlation is used.

With the intention of comparing the groups with higher Mediterranean diet adherence with those that have lower Mediterranean diet adherence, the binary logistic regression model was used in this research. This technique was also used for those that have made more changes in their eating habits with those that have made less changes in their eating habits since migration. The Mediterranean diet adherence scale and the level of changes in eating habits were first divided into two groups (bins, categories), according to their median values.

In binary logistic regression, one of the categories of the covariates should be taken as the reference category. This means that all the other categories are compared with this reference category. Crude and adjusted odds ratio (OR) were calculated, together with their 95% confidence intervals (95% CI)

Chapter 4

Results

In section 4.1, the sociodemographic characterization of the respondents is shown, and also the average of the Mediterranean diet score and cooking skills scale score for each group is illustrated. In section 4.2, the responses of the participants for the questions of lifestyle and the health status are given. Responses to food habits and food preparation habits questions are respectively represented in sections 4.3 and 4.4. In sections 4.5 and 4.6 the influence of sociodemographic characteristics, lifestyle, health status and cooking skills on Mediterranean diet adherence and global changes on eating habits is studied.

4.1 Sociodemographic characterization

Table 4.1 intends to show general characterization of the respondents. Female respondents corresponded to 49.3% and 50.7% were male. The average age of the participants was 32.55 $\pm$ 5.82 years. The youngest respondent was 20 years old and the oldest 58 years old: 40% of them were below 30 years old, 58.5% were between 31 and 50, and the remaining were older than 50. Results show that the female respondents have higher scores for adherence to the Mediterranean diet and cooking skills scale compared to male participants.

The majority of respondents had higher education. Only 15 respondents (3.7%) did not have higher education, whereas 48.9% of them had Master degrees, 27.2% had PhD and 20.2% of the participants had Bachelor degree. Adherence to the Mediterranean diet among respondents with different education levels does not differ too much, but the results show that the respondents without university education have higher levels

Table 4.1: Personal and living characteristics of the respondents.

				Cooking skills scale	Mediterranean Diet
		Number	Percentage	Mean ± SD	
Sex	Female	202	49.3	4.27 ± 1.15	6.42 ± 2.25
	Male	208	50.7	3.56 ± 1.20	5.97 ± 2.03
Age (32.55 ± 5.82)	0 to 30	164	40	3.92 ± 1.20	5.92 ± 2.06
	31 to 50	240	58.5	3.90 ± 1.25	6.33 ± 2.15
	51 to 70	6	1.5	4.79 ± 0.66	9.00 ± 2.10
Education	Without university education	15	3.7	4.08 ± 1.34	6.21 ± 2.78
	Bachelor	82	20.2	3.76 ± 1.18	6.18 ± 2.15
	Master	198	48.9	3.98 ± 1.23	6.22 ± 2.14
	PhD	110	27.2	3.84 ± 1.26	6.22 ± 2.09
Employment	Employed	150	37.8	4.00 ± 1.17	6.36 ± 2.26
	Unemployed	33	8.3	3.81 ± 1.15	6.88 ± 2.34
	Housekeeper	18	4.5	4.32 ± 1.15	6.11 ± 1.57
	Student	196	49.4	3.79 ± 1.27	5.95 ± 2.09
Marital status	Single	181	44.1	3.62 ± 1.12	5.83 ± 2.20
	Married	213	52	4.10 ± 1.25	6.39 ± 2.04
	Divorced/Separated	15	3.7	4.40 ± 1.36	7.47 ± 2.03
	Widowed	1	0.2	5.57 ± 0.00	11.00 ± 0
EU region	Northern Europe	72	17.6	4.04 ± 1.13	6.61 ± 2.34
	Western Europe	149	36.4	3.89 ± 1.28	6.07 ± 2.05
	Eastern Europe	6	1.5	3.94 ± 1.42	5.00 ± 1.83
	Southern Europe	182	44.5	3.88 ± 1.20	6.20 ± 2.14
Type of house	Entire house/apartment (rented or purchased)	279	67.7	4.06 ± 1.23	6.40 ± 2.11
	Shared house or rented room	63	15.3	3.50 ± 1.02	5.73 ± 2.42
	Student residence	63	15.3	3.61 ± 1.25	5.84 ± 1.88
	Parental housing	4	1	3.86 ± 1.79	7.50 ± 2.38
	House of other family members	3	0.7	3.57 ± 0.00	4.67 ± 2.31
With whom do you live?	Alone	120	28.99	3.51 ± 1.20	5.89 ± 2.16
	Father/Mother	6	1.45	3.91 ± 1.53	7.00 ± 3.03
	Brothers/Sisters	8	1.93	4.76 ± 0.74	7.25 ± 2.25
	Husband/Wife	199	48.07	4.12 ± 1.22	6.40 ± 2.03
	Other family members	3	0.72	2.76 ± 0.86	4.33 ± 2.08
	Girlfriend/Boyfriend	29	7	4.44 ± 1.04	6.93 ± 2.19
	Friends/colleagues	46	11.11	3.55 ± 0.97	5.64 ± 2.20
	Children	35	8.45	4.48 ± 1.11	6.38 ± 2.26

of cooking skills.

A high proportion of respondents were employed (37.8%) or students (49.4%). Other 12.8% of the respondents were unemployed or housekeeper. Housekeepers have higher levels of cooking skills and the unemployed respondents had more adherence in their diet to the Mediterranean diet.

Regarding the marital status, 52% of those who participated in this research were married, 44.1% were single and the remaining 3.9% were divorced, separated or widowed. Comparing the married respondents with the single respondents, which are the two main groups that participated in this survey, marrieds have better cooking skills and they also have a diet with more proximity to the Mediterranean diet.

Concerning the geographic region that the respondents currently reside in, most of the respondents belong to Southern Europe with 44.5%, while 36.4% of them reside in Western Europe, 17.6% live in Northern Europe and a small number of participants (1.5%) live in Eastern Europe. The top 3 countries with higher number of respondents are Portugal with 82 participants, Italy with 71 respondents and France with 49 respondents. Respondents in Northern Europe have higher averages of cooking skills and more adherence to the Mediterranean diet.

About 67.7% of the respondents have chosen an entire apartment or house to live. About 15.3% live in a shared house/room and similar number of respondents also live in student residences. The remaining 1.7% of the participants live in house of other family members. Participants who rented the entire house/apartment had higher levels of cooking skills, and after the small group of participants that live in parental housing, they have diets with higher adherence to the Mediterranean diet.

Among the participants of this survey, 48.1% of respondents live with their husband/wife, 29.0% live alone, 7% live with their girlfriend/boyfriend, 11.1% live with their friends or colleagues and 8.4% of respondents live with their children. Only 1.4% of respondents live with their parents. The adherence to the Mediterranean diet of respondents who live alone or live with friends/colleagues is below the average score of all participants. This conditions also exists in the case of cooking skills.

Figure 4.1 shows that those who are living alone did not have high scores for the cooking skills scale and adherence to the Mediterranean diet. The best case for Mediterranean and cooking skills scale is observed among those that live with their brothers or sisters.

Values in Table 4.2 show that the respondents living in Northern Europe have been living longer in the country that they currently live than other respondents, and they are more willing to live in the country that they are currently living.

Table 4.2: Willingness to stay in the foreign country that they reside (5 points scale: 1="Not at all" to 5="Certainly yes") and the total months that they live in that country.

	Willingness	**Months**
	Mean ± SD	
Northern Europe	4.44 ± 1.01	103.07 ± 98.93
Western Europe	4.41 ± 1.03	54.26 ± 42.28
Eastern Europe	4.33 ± 1.03	72.00 ± 45.88
Southern Europe	3.89 ± 1.25	44.88 ± 26.41

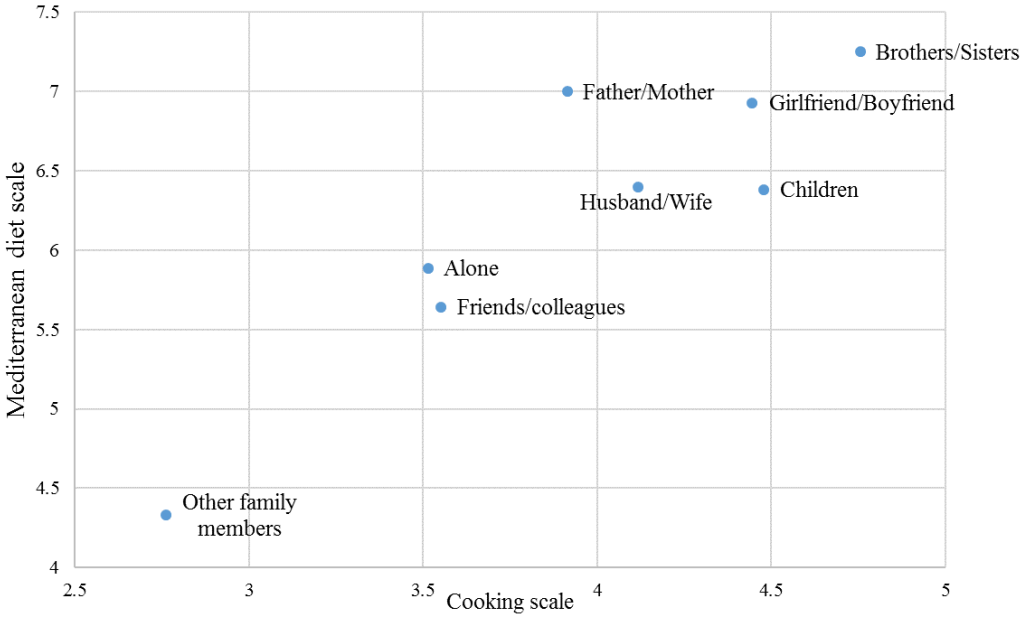

Figure 4.1: Average of cooking skills scale and Mediterranean diet adherence scale

4.2 Lifestyles and health status

Table 4.3 shows the lifestyle and health status of the respondents. Although the number of respondents who did not have any type of physical activity before the immigration has decreased, the average number of days that all participants have some type of activity before immigration (2.27) and after immigration (2.24) had not changed significantly. The average score of adherence to the Mediterranean diet for the participants with 5 or more days of physical activity in a typical week after migration is above the average of all respondents.

Some respondents (24) reported having chronic diseases. Among the participants in the survey, 74% of them were nonsmokers, 14.1% were former smokers and the remaining 11.9% were smokers. The average number of cigarettes that the last group smoke during a day is 5.58. Non smokers have higher score in adherence to the Mediterranean diet, compared to smokers and former smokers.

As shown in Table 4.3, about half of the participants reported that their health status had not changed significantly since migration. About 22.9% of the respondents believed that their health status had been improved, while about 15.2% of them believed that their health status had worsened since migration. The remaining respondents did not know how their health status has changed. Those that believe that their health status has worsened since migration have the lowest score in adherence to the

Mediterranean diet and highest score in the cooking skills. The respondents that believe their health status has improved had highest score in the adherence to the Mediterranean diet.

Table 4.3: Lifestyle and health status of respondents.

				Cooking skills scale	**Mediterranean Diet**
		Number	**Percentage**	**Mean ± SD**	
Days with some kind of physical activity in a typical week (before immigration)	0	95	23.7	3.79 ± 1.26	5.97 ± 2.13
	1	79	19.7	3.75 ± 1.18	5.99 ± 2.12
	2	67	16.7	3.99 ± 1.23	6.15 ± 2.29
	3	66	16.5	3.99 ± 1.09	6.48 ± 2.12
	4	37	9.2	4.13 ± 1.22	6.70 ± 2.13
	5	19	4.7	3.53 ± 1.16	6.16 ± 1.71
	6	9	2.2	4.46 ± 1.16	5.89 ± 1.90
	7	29	7.2	4.01 ± 1.47	6.46 ± 2.22
Days with some kind of physical activity in a typical week (after immigration)	0	74	18.6	3.77 ± 1.30	5.52 ± 2.08
	1	84	21.2	3.82 ± 1.28	6.38 ± 2.01
	2	77	19.4	3.94 ± 1.33	6.03 ± 1.91
	3	77	19.4	4.08 ± 0.99	6.38 ± 2.25
	4	34	8.6	4.02 ± 1.18	6.03 ± 2.17
	5	32	8.1	4.25 ± 1.14	6.70 ± 2.22
	6	6	1.5	3.71 ± 0.76	8.33 ± 2.07
	7	13	3.3	3.69 ± 1.26	7.00 ± 2.00
Smoking habits	Non smoker	305	74	3.94 ± 1.27	6.37 ± 2.16
	Former smoker	58	14.1	3.81 ± 1.03	5.95 ± 1.92
	Smoker	49	11.9	3.84 ± 1.18	5.46 ± 2.20
Changes of health status since migration (self-report).	Has improved	95	22.9	3.98 ± 1.09	6.84 ± 2.06
	Not changed significantly	204	49.3	3.86 ± 1.24	6.21 ± 2.06
	Has worsened	63	15.2	4.04 ± 1.30	5.37 ± 2.14
	I don't know	51	12.3	3.82 ± 1.26	6.02 ± 2.30
Influence of food habits on health status (self-report).	Little influence	62	15	3.82 ± 1.24	5.95 ± 2.07
	2	45	10.9	4.02 ± 1.12	5.71 ± 2.35
	3	136	32.9	3.92 ± 1.26	6.07 ± 2.11
	4	101	24.5	3.84 ± 1.21	6.37 ± 1.84
	Lots of influence	69	16.7	4.01 ± 1.24	6.80 ± 2.44
BMI	<18.5 (under weight)	17	4.3	3.05 ± 1.61	5.73 ± 2.22
	18.5-24.9 (normal weight)	256	64	4.00 ± 1.15	6.24 ± 2.15
	25.0-29.9 (over weight)	103	25.8	3.81 ± 1.25	6.09 ± 2.21
	>30 (obese)	24	6	4.17 ± 1.14	6.21 ± 2.00

In this table the perception of respondents about the impact of food habits on their health status and the degree of changes in eating habits since migration have been shown. Figure 4.2 shows the average score of the Mediterranean diet adherence with

regard to the perception of respondents on the influence of food habits on health status. The more value they give to health consequences of food habits, the more they have diets near to Mediterranean diet. This shows that people that have this perception that food habits have influence their health status better follow healthy diets.

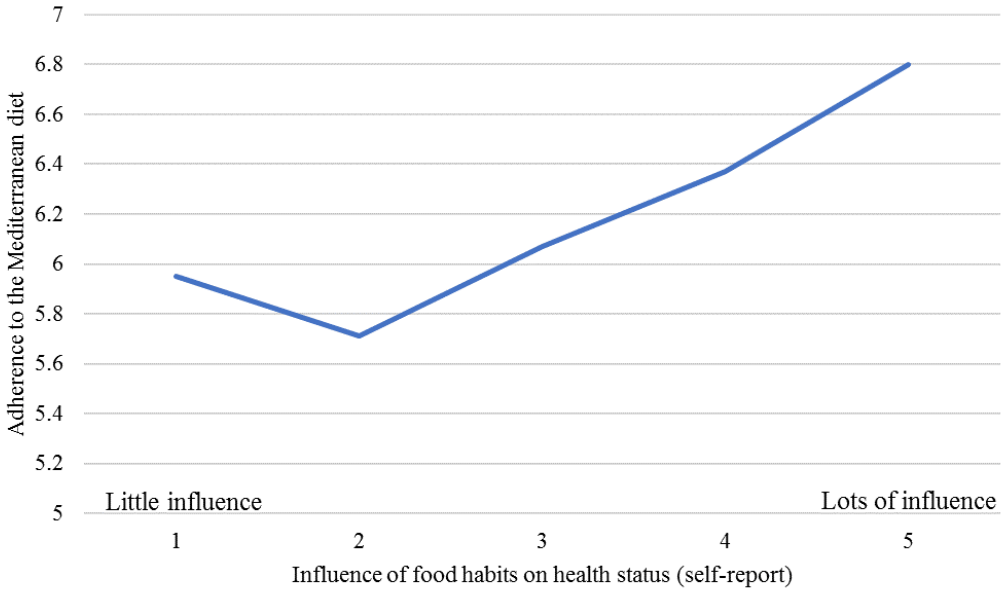

Figure 4.2: Relationship between the influence of food habits on health status and the adherence to the Mediterranean diet

Results show that the obese respondents and the participants with normal weight both have higher adherence to the Mediterranean diet and higher levels of cooking skills compared to underweight and overweight respondents.

4.3 Food habits

Tables 4.4 and 4.5 shows the food related habits of Iranian residents. Frequency of eating different meals during a typical week before and after immigration have been questioned from the participants and the results are illustrated in Table 4.4. The frequency of eating breakfast before and after immigration has not changed too much. Highest average for cooking skills scale and adherence to the Mediterranean diet was found for participants that everyday eat breakfast.

Eating morning snack was not so common among the participants. The share of participants that had eaten morning snack before immigration more than 4 times per week is 25.8% and after immigration this share increases to 28.6%.

Table 4.4: Food habits before and after immigration.

				Cooking skills scale	Mediterranean Diet
		Number	Percentage	Mean ± SD	
Frequency of eating breakfast (before immigration)	Never or less than 1 per week	47	12.2	3.94 ± 1.31	5.81 ± 2.40
	1-3 per week	60	15.5	3.76 ± 1.20	6.02 ± 1.91
	4-6 per week	54	14	3.81 ± 1.07	5.98 ± 2.47
	Every day	225	58.3	3.91 ± 1.25	6.33 ± 2.04
Frequency of eating breakfast (after immigration)	Never or less than 1 per week	31	8.4	3.51 ± 1.16	5.36 ± 2.16
	1-3 per week	56	15.1	3.68 ± 1.30	5.59 ± 2.41
	4-6 per week	46	12.4	3.68 ± 1.19	6.16 ± 1.86
	Every day	238	64.2	4.10 ± 1.19	6.54 ± 2.01
Frequency of eating morning snack (before immigration)	Never or less than 1 per week	172	**47.6**	3.87 ± 1.23	6.28 ± 2.07
	1-3 per week	96	26.6	3.97 ± 1.28	6.10 ± 2.01
	4-6 per week	43	11.9	3.92 ± 1.16	5.71 ± 2.39
	Every day	50	13.9	3.94 ± 1.24	6.13 ± 2.33
Frequency of eating morning snack (after immigration)	Never or less than 1 per week	127	**39.4**	3.78 ± 1.24	5.95 ± 2.16
	1-3 per week	103	32	4.08 ± 1.22	6.53 ± 1.86
	4-6 per week	54	16.8	3.81 ± 1.31	6.38 ± 1.99
	Every day	38	11.8	4.13 ± 1.06	6.03 ± 2.28
Frequency of eating lunch (before immigration)	Never or less than 1 per week	4	1.1	3.50 ± 2.16	7.00 ± 1.15
	1-3 per week	12	3.2	3.87 ± 1.44	7.00 ± 2.17
	4-6 per week	28	7.4	3.74 ± 1.19	5.69 ± 2.63
	Every day	335	**88.4**	3.91 ± 1.21	6.18 ± 2.09
Frequency of eating lunch (after immigration)	Never or less than 1 per week	16	4.3	4.12 ± 1.28	7.20 ± 1.52
	1-3 per week	28	7.6	3.78 ± 1.41	6.28 ± 2.95
	4-6 per week	54	14.6	4.07 ± 1.28	6.17 ± 2.38
	Every day	272	**73.5**	3.91 ± 1.18	6.26 ± 1.96
Frequency of eating afternoon snack (before immigration)	Never or less than 1 per week	84	22.3	3.68 ± 1.35	6.06 ± 2.07
	1-3 per week	132	35	3.94 ± 1.18	6.20 ± 1.99
	4-6 per week	85	22.5	3.92 ± 1.20	6.22 ± 2.32
	Every day	76	20	4.07 ± 1.18	6.23 ± 2.16
Frequency of eating afternoon snack (after immigration)	Never or less than 1 per week	89	26.2	3.63 ± 1.21	6.20 ± 1.91
	1-3 per week	107	31.5	3.98 ± 1.25	6.19 ± 2.33
	4-6 per week	84	24.7	4.09 ± 1.19	6.33 ± 2.06
	Every day	60	17.6	4.07 ± 1.15	6.30 ± 1.94
Frequency of eating dinner (before immigration)	Never or less than 1 per week	7	1.8	3.95 ± 1.02	6.71 ± 2.63
	1-3 per week	44	11.5	4.07 ± 1.17	5.83 ± 1.83
	4-6 per week	51	13.4	3.70 ± 1.18	5.94 ± 2.42
	Every day	280	**73.3**	3.88 ± 1.25	6.25 ± 2.11
Frequency of eating dinner (after immigration)	Never or less than 1 per week	15	4.1	3.78 ± 1.32	6.87 ± 1.85
	1-3 per week	56	15.3	3.89 ± 1.17	5.93 ± 2.46
	4-6 per week	65	17.8	3.76 ± 1.32	5.92 ± 1.65
	Every day	229	**62.7**	3.97 ± 1.20	6.39 ± 2.13
Frequency of eating night snack (before immigration)	Never or less than 1 per week	183	49.9	3.96 ± 1.24	6.27 ± 1.98
	1-3 per week	86	23.4	3.78 ± 1.27	6.09 ± 2.21
	4-6 per week	48	13.1	3.72 ± 1.19	5.64 ± 2.38
	Every day	50	13.6	4.09 ± 1.10	6.59 ± 2.30
Frequency of eating night snack (after immigration)	Never or less than 1 per week	152	46.1	3.82 ± 1.27	6.20 ± 1.99
	1-3 per week	86	26.1	3.86 ± 1.18	6.39 ± 2.27
	4-6 per week	39	11.8	3.98 ± 1.26	6.13 ± 2.04
	Every day	53	16.1	4.15 ± 1.12	6.46 ± 1.91

Lunch is the most popular meal during a typical week for the Iranian respondents. Before immigration 88.4% of the respondents eat lunch every day during a typical week. This share decreases to 73.5% after immigration. After immigration, a higher proportion of those that do not eat lunch in a typical week was observed.

Table 4.5: Changes in food habits since migration.

				Cooking skill scale	Mediterranean Diet
		Number	Percentage	Mean ± SD	
The degree of changes in eating habits since migration (self-report) (3.49 ± 1.12)	1 (No change)	19	4.6	4.10 ± 1.27	6.21 ± 1.90
	2	61	14.8	3.85 ± 1.28	5.91 ± 2.27
	3	118	28.6	3.92 ± 1.21	5.98 ± 1.86
	4	128	31	3.79 ± 1.19	6.28 ± 2.27
	5 (Lots of change)	87	21.1	4.08 ± 1.23	6.59 ± 2.26
Changes of meal number since migration (2.65 ± 1.38)	1 (No change)	116	28.4	3.88 ± 1.23	6.40 ± 1.99
	2	82	20	3.76 ± 1.22	5.94 ± 2.01
	3	99	24.2	3.80 ± 1.22	6.14 ± 1.94
	4	54	13.2	4.06 ± 1.18	6.51 ± 2.64
	5 (Lots of change)	58	14.2	4.23 ± 1.22	5.91 ± 2.40
Changes of amount of food since migration (3.14 ± 1.29)	1 (No change)	50	12.3	4.06 ± 1.38	6.52 ± 1.87
	2	88	21.7	3.98 ± 1.18	5.85 ± 2.14
	3	96	23.7	3.88 ± 1.14	6.12 ± 2.10
	4	96	23.7	3.79 ± 1.26	6.34 ± 2.09
	5 (Lots of change)	75	18.5	3.89 ± 1.24	6.23 ± 2.36
Changes of meal times since migration (3.07 ± 1.37)	1 (No change)	68	16.8	4.00 ± 1.19	6.17 ± 1.97
	2	80	19.8	3.70 ± 1.29	5.92 ± 2.08
	3	91	22.5	3.73 ± 1.21	6.09 ± 1.99
	4	56	21.2	4.07 ± 1.16	6.72 ± 2.22
	5 (Lots of change)	80	19.8	3.98 ± 1.24	5.89 ± 2.26
Changes of place of eating since migration (3.31 ± 1.38)	1 (No change)	56	13.8	3.76 ± 1.21	6.88 ± 2.06
	2	65	16	4.14 ± 1.27	6.19 ± 1.92
	3	92	22.7	3.97 ± 1.22	6.21 ± 2.36
	4	82	22	3.86 ± 1.24	6.16 ± 1.96
	5 (Lots of change)	110	27.2	3.84 ± 1.20	5.79 ± 2.16
Changes of type of food since migration (3.86 ± 1.12)	1 (No change)	13	3.2	3.82 ± 0.97	5.46 ± 1.94
	2	42	10.3	4.13 ± 1.14	5.83 ± 1.77
	3	84	20.6	4.01 ± 1.20	6.39 ± 2.22
	4	121	29.7	3.81 ± 1.19	6.08 ± 2.04
	5 (Lots of change)	148	36.3	3.87 ± 1.30	6.33 ± 2.26
Type of changes in meal number since migration	Has decreased	104	25.2	3.96 ± 1.20	5.83 ± 2.35
	Has not significantly changed	232	56.3	3.79 ± 1.21	6.20 ± 1.99
	Has increased	76	18.4	4.18 ± 1.24	6.67 ± 2.27
Type of changes in amount of food since migration	Has decreased	147	35.8	3.82 ± 1.17	6.35 ± 2.23
	Has not significantly changed	173	42.1	3.96 ± 1.25	6.22 ± 2.07
	Has increased	91	22.1	3.96 ± 1.27	5.97 ± 2.17
Missing the Iranian cuisine (3.66 ± 1.262)	I don't miss at all	28	6.8	4.63 ± 1.17	7.81 ± 2.10
	2	52	12.6	4.19 ± 1.17	6.92 ± 2.09
	3	98	23.7	3.95 ± 1.08	5.99 ± 2.20
	4	89	21.5	3.92 ± 1.26	6.49 ± 1.94
	I miss a lot	146	35.4	3.65 ± 1.25	5.63 ± 2.03

Afternoon snack was more common among the respondents, compared to morning snack. The number of respondents that eat afternoon snack more than 4 times in a typical week before and after the immigration was respectively 42.5% and 42.3%. For the case of dinner, again the same situation that have been observed for the lunch exists: the adherence to the Mediterranean diet is higher among those that do not eat dinner in a typical week. Those respondents that every day eat a night snack have higher average of cooking skills score and also higher average of adherence to the Mediterranean diet.

Table 4.5 shows how respondents selected the degree of changes in eating habits since migration. The respondents have answered to a question which shows the level of changes in each of the food related habits. The highest changes have been reported in

type of food that they have been eating since migration. The direction of the changes for meal number and amount of food are also illustrated in this table. It also illustrates how participants have missed Iranian cuisine.

Table 4.6 shows the daily food habits of respondents and Table 4.7 shows the weekly food habits.

Table 4.6: Daily food habits of Iranian residents in Europe.

		Per day frequency					**1 point (satisfied the criterion)**
		None /Less than 1	**1**	**2**	**3**	**4 or more**	
Tablespoons of olive oil (including that used in frying, salads, meals eaten away from home, etc)	Number	100	103	95	63	46	46
	Percentage	24.6	25.3	23.3	15.5	11.3	11.1
Servings of vegetables (1 serving: 200 g [consider side dishes as half a serving])	Number	43	130	129	60	44	233
	Percentage	10.6	32	31.8	14.8	10.8	56.3
Number of fruit units (including fresh squeezed fruit juices) (ex: 1 fruit unit is 1 slice of melon or pineapple; 1 whole apple or banana; 2 whole plums or kiwi fruits; 1 cupful of raspberries or grapes)	Number	37	102	134	78	56	134
	Percentage	9.1	25.1	32.9	19.2	13.8	32.4
Servings of red meat, hamburger, or meat products (ham, sausage, etc.) (1 serving: 10-150 g)	Number	114	152	78	46	17	114
	Percentage	28	37	19	11	4	27.5
Servings of butter, margarine, or cream (1 serving: 12 g)	Number	223	110	50	13	10	223
	Percentage	53.9	26.6	12.1	3.1	2.4	53.9
Cups of sweet or carbonated beverages (1 cup: 100 ml)	Number	195	97	67	31	18	195
	Percentage	47.8	23.8	16.4	7.6	4.4	47.1

The average score of respondents on the adherence to the Mediterranean diet was 6.20 $\pm$ 2.15 for the 395 respondents who answered all the 14 questions. About 60.9% of the respondents used olive oil as the principal source of fat for cooking and 72.2% of them prefer to eat chicken, turkey or rabbit instead of beef, pork, hamburgers or sausages. In the question of olive oil consumption per day only 11.1% of the participants were

Table 4.7: Weekly food habits of Iranian residents in Europe.

		Per week frequency								1 point (satisfied the criterion)
		None or Less than 1	1	2	3	4	5	6	7 or more	
Cups of wine (1 cup: 100ml)	Number	263	47	46	19	13	4	6	9	9
	Percentage	64.6	11.5	11.3	4.7	3.2	1	1.5	2.2	2.2
Servings of legumes (ex: red beans, peas, fava beans, chick-peas) (1 serving: 150 g)	Number	56	115	97	76	36	15	5	5	137
	Percentage	13.8	28.4	24	18.8	8.9	3.7	1.2	1.2	33.1
Servings of fish or shellfish (1 serving: 10-150 g of fish or 45 units or 200 g of shellfish)	Number	89	90	92	62	40	21	6	6	135
	Percentage	21.9	22.2	22.7	15.3	9.9	5.2	1.5	1.5	32.6
Number of times consuming commercial sweets or pastries (not homemade), such cookies	Number	83	92	77	62	36	25	10	18	252
	Percentage	20.6	22.8	19.1	15.4	8.9	6.2	2.5	4.5	60.9
Servings of nuts (including peanuts) (1 serving: 30 g)	Number	65	92	89	79	25	23	13	19	159
	Percentage	16	22.7	22	19.5	6.2	5.7	3.2	4.7	38.4
Number of times consuming boiled vegetables, pasta, rice, or other dishes with a sauce of tomato, garlic, onion, or leeks sautéed in olive oil	Number	32	49	64	61	53	63	41	42	324
	Percentage	8	12	16	15	13	16	10	10	78.3

able to fulfill the criterion. The next question for daily consumption that only a small proportion of the participants were able to satisfy the criterion is the consumption of red meat, hamburger, or meat products. Only 27.5% received 1 point for this question.

For the daily consumption, the two questions with highest proportions of respondents that satisfied the criterion are servings of vegetables with 56.3% and servings of butter, margarine, or cream with 53.9%.

For the weekly consumption, the amount of wine taken per week and the servings of fish or shellfish eaten during a typical week are the two questions with lowest proportions of the respondents who satisfied the criterion, respectively with 2.2% and 32.6%. The best cases are the consumption of boiled vegetables, pasta, rice, or other dishes with sauce with 78.3% and the consumption of commercial sweets and pastries with 60.9%.

4.4 Food preparation

The degree of agreement with specific sentences regarding cooking skills is shown in Table 4.8. The results show that people had less confidence in baking bread than other foods. The average level of cooking skills scale of the respondents was 3.91 ± 1.22 for the 286 participants that answered all the 7 questions.

Table 4.8: The cooking skills scale (Hartmann et al., 2013): degree of agreement with general and specific cooking skills .

	Number (Percentage)						Mean ± SD
	1 (Do not agree at all)	**2**	**3**	**4**	**5**	**6 (Totally agree)**	
I consider my cooking skills as sufficient.	21 (5.2%)	29 (7.2%)	69 (17.0%)	71 (17.5%)	104 (25.7%)	111 (27.4%)	4.34 ± 1.47
I am able to prepare a hot meal without a recipe.	13 (3.1%)	28 (6.8%)	35 (8.5%)	53 (12.8%)	91 (22%)	184 (44.4%)	4.81 ± 1.43
I am able to prepare gratin.	72 (17.4%)	58 (14%)	72 (17.4%)	67 (16.2%)	56 (13.5%)	71 (17.1%)	3.48 ± 1.73
I am able to prepare soup.	13 (3.1%)	24 (5.8%)	42 (10.1%)	46 (11.1%)	88 (21.3%)	191 (46.1%)	4.84 ± 1.43
I am able to prepare sauce.	37 (8.9%)	62 (15%)	65 (15.7%)	63 (15.2%)	70 (16.9%)	106 (25.6%)	3.96 ± 1.69
I am able to bake cake.	110 (26.6%)	61 (14.7%)	52 (12.6%)	45 (10.9%)	47 (11.4%)	89 (21.5%)	3.31 ± 1.93
I am able to bake bread.	161 (38.9%)	73 (17.6%)	43 (10.4%)	47 (11.4%)	34 (8.2%)	47 (11.4%)	2.66 ± 1.78

Table 4.9 demonstrates the results for the cooking skills of the respondents. They were allowed to evaluate their own cooking skills in a range between 1 and 6. As shown in this table, the most relevant source for learning how to cook is from the mother and then from internet. Those that have used internet as a learning source have higher adherence to the Mediterranean diet.

The Spearman's correlation indicated that the total cooking skills score is strongly correlated with how respondents describe their cooking skills ($r = 0.672, P < 0.01$) and with their agreement with considering their cooking skills as sufficient ($r = 0.710, P < 0.01$).

Table 4.10 shows the frequency of cooking and shopping for food needs before and after immigration. The results clearly show that participants cook more after immigration and also go more to shopping for food needs.

Table 4.9: Self-evaluation of cooking skills and learning sources.

		Number	Percentage	Mediterranean Diet (Mean ± SD)
Self-evaluation of cooking skills	1 (Very bad)	12	2.9	6.08 ± 2.47
	2	17	4.1	5.44 ± 1.63
	3	62	15	5.61 ± 2.34
	4	106	25.7	5.96 ± 2.04
	5	115	27.8	6.61 ± 2.06
	6 (Very good)	101	24.5	6.48 ± 2.17
Most relevant sources for learning how to cook	Alone	67	16.8	6.13 ± 2.13
	Mom	188	47.1	5.98 ± 2.17
	Friends	19	4.8	6.17 ± 2.53
	Internet websites	109	27.3	6.68 ± 2.00
	Other sources	16	4.2	5.81 ± 2.40

Table 4.10: Food preparation habits before and after immigration.

		Never	Less than once per month	1 to 3 times per month	1 to 3 times per week	4 to 6 times per week	Every day or more than once per day
How often do you cook?	Before immigration	78 (19.5%)	77 (19.3%)	77 (19.3%)	65 (16.3%)	51 (12.8%)	52 (13%)
	After immigration	9 (2.3%)	14 (3.6%)	34 (8.8%)	100 (25.9%)	109 (28.2%)	120 (31.1%)
How often do you do the shopping for your food needs?	Before immigration	65 (16.0%)	55 (13.5%)	104 (25.6%)	132 (32.4%)	40 (9.8%)	11 (2.7%)
	After immigration	2 (0.5%)	8 (2%)	57 (14.4%)	216 (54.7%)	78 (19.7%)	34 (8.6%)

4.5 Other variables influence on Mediterranean diet adherence

In Table 4.11, the influence of sociodemographic data, health status and cooking skills on adherence to the Mediterranean diet is shown with ORs and their 95% CIs obtained from logistic regression. The dependent variable in this analysis is the Mediterranean diet adherence score. Regarding the independent effect of some variables, the impact of cooking skills on the adherence to the Mediterranean diet was significant. Each 1 unit increase in the cooking skills level leads to more 18% chance of belonging to the Mediterranean diet higher than 6. However, when the model is adjusted, taking into account all variables shown in the table, this effect was lost. Only students were less likely to follow the Mediterranean diet, compared to respondents with other employment status [OR 0.48: (95% CI: 0.24-0.96)].

The results also show that the male respondents have lower probability to belong to the group of respondents that have Mediterranean diet adherence score above 6. However, this is not significant. The duration that the respondents have spent out of Iran also

Table 4.11: Influence of sociodemographic data, health status and lifestyle to the adherence to the Mediterranean diet (>6 versus ≤ 6).

		β (95% CI for β)	
		Crude	**Adjusted**
Sex	Female (ref.)	1	1
	Male	0.74 (0.50-1.11)	0.81 (0.42-1.57)
EU region	Northern Europe (ref.)	1	1
	Western Europe	0.69 (0.39-1.22)	0.71 (0.31-1.62)
	Southern Europe	0.73 (0.42-1.26)	1.00 (0.42-2.38)
Employment status	Employed (ref.)	1	1
	Unemployed	2.14 (0.97-4.74)	2.24 (0.62-8.05)
	Housekeeper	0.68 (0.25-1.86)	0.73 (0.20-2.69)
	Student	0.66 (0.44-1.03)	**0.48 (0.24-0.96)**
Education	Without university education (ref.)	1	1
	Bachelor	0.96 (0.30-3.05)	3.50 (0.47-25.96)
	Master	1.15 (0.39-3.45)	5.38 (0.78-37.14)
	PhD	1.01 (0.33-3.10)	3.93 (0.54-28.50)
Marital status	Single (ref.)	1	1
	Married	1.17 (0.78-1.76)	1.05 (0.55-1.98)
	Divorced/separated	2.85 (0.93-8.68)	15.35 (1.28-183.28)
Smoking habits	Nonsmoker (ref.)	1	1
	Former smoker	0.69 (0.39-1.25)	0.70 (0.31-1.57)
	Smoker	0.66 (0.35-1.25)	1.01 (0.37-2.74)
Chronic diseases	With chronic diseases (ref.)	1	1
	Without chronic diseases	0.80 (0.35-1.82)	0.96 (0.33-2.79)
Breakfast eating frequency after immigration	Never or less than 1 per week (ref.)	1	1
	1-3 per week	1.15 (0.43-3.02)	0.52 (0.14-1.89)
	4-6 per week	1.13 (0.41-3.11)	0.65 (0.16-2.53)
	Every day	2.28 (0.99-5.25)	1.23 (0.43-3.55)
Age		1.02 (0.99-1.06)	0.96 (0.90-1.04)
Months out of Iran		1.00 (1.00-1.01)	1.00 (1.00-1.01)
BMI		0.99 (0.94-1.05)	1.00 (0.92-1.09)
Cooking skills scale		**1.18 (1.01-1.41)**	0.95 (0.74-1.21)

does not influence belonging to the upper Mediterranean diet adherence group.

4.6 Other variables influence on changes of eating habits

Table 4.12 shows the association between the sociodemographic data, health status and eating habits with the changes of eating habits since migration with ORs and their 95% CIs obtained from logistic regression. The changes of eating habits are self-reported by the participants in the survey in a 1-5 scale, changing from no change to lots of change.

After adjusting the model and considering all variables, the results show that participants with PhD, compared to respondents without university education are less

Table 4.12: Influence of sociodemographic data, health status and lifestyle on changes of eating habits since migration (>4 versus $\leq$ 4).

		β (95% CI for β)	
		Crude	**Adjusted**
Sex	Female (ref.)	1	1
	Male	**0.58 (0.36-0.94)**	**0.40 (0.17-0.93)**
EU region	Northern Europe (ref.)	1	1
	Western Europe	1.04 (0.53-2.03)	0.97 (0.37-2.55)
	Southern Europe	0.75 (0.38-1.47)	0.41 (0.13-1.23)
Employment status	Employed (ref.)	1	1
	Unemployed	0.61 (0.22-1.70)	0.15 (0.02-1.47)
	Housekeeper	0.68 (0.19-2.50)	0.26 (0.03-2.41)
	student	0.90 (0.54-1.51)	0.61 (0.26-1.45)
Education	Without university education (ref.)	1	1
	Bachelor	0.45 (0.14-1.43)	0.17 (0.03-1.15)
	Master	0.44 (0.15-1.31)	0.19 (0.03-1.14)
	PhD	**0.26 (0.08-0.82)**	**0.12 (0.02-0.86)**
Marital status	Single (ref.)	1	1
	Married	**0.58 (0.35-0.95)**	0.55 (0.24-1.26)
	Divorced/separated	1.07 (0.32-3.52)	0.55 (0.07-4.45)
Smoking habits	Nonsmoker (ref.)	1	1
	Former smoker	0.85 (0.41-1.78)	0.60 (0.19-1.91)
	Smoker	**2.17 (1.13-4.17)**	**3.70 (1.14-12.04)**
Chronic diseases	With chronic diseases	1	1
	Without chronic diseases	0.63 (0.25-1.57)	0.93 (0.25-3.43)
Breakfast eating frequency after immigration	Never or less than 1 per week (ref.)	1	1
	1-3 per week	0.77 (0.29-2.00)	0.71 (0.18-2.88)
	4-6 per week	**0.26 (0.08-0.85)**	0.37 (0.07-1.99)
	Every day	0.53 (0.23-1.20)	0.56 (0.18-1.79)
Age		1.00 (0.96-1.04)	0.95 (0.87-1.04)
Months out of Iran		1.00 (1.00-1.01)	1.00 (0.99-1.00)
BMI		1.03 (0.97-1.10)	1.06 (0.96-1.18)
Cooking skills scale		1.16 (0.94-1.42)	0.99 (0.72-1.36)
Mediterranean diet adherence score		1.11 (0.99-1.25)	1.17 (0.97-1.41)

likely to make great changes in their eating habits since migration [OR: 0.12 (95% CI: 0.02-0.86)]. Males compared to females were also significantly less likely to belong to the group of respondents who have reported higher changes in eating habits since migration [OR: 0.40 (95% CI: 0.17-0.93)]. We also found that reporting higher changes in eating habits among the smokers was more frequent, compared to nonsmokers [OR: 3.70 (95% CI: 1.14-12.04)].

Chapter 5

Discussion

Most of the 415 Participants in this survey were young Iranian population residing in Europe for few years. The average age of the respondents was 32.5 ± 5.8 years and the average months that they were out of Iran was 76.5 ± 75.2. The majority of respondents had university education. Only 3.7% of them were without university education, and a high percentage of them (76.1%) had post-graduate degrees. The respondents were living in all the 4 sub-regions of Europe. However, the majority were living in Southern and Western Europe (80.9%). Almost half of them were university students. They are the immigrants that have left their home country for studying purposes. More than half of the respondents (52%) were married and 44% were single. The majority of them (67.7%) have rented or purchased a home or an apartment to have an independent life. Around half of them (48.1%) were living with their wife/husband, and 29% were living alone.

Almost half of the respondents (49.3%) believed that their health status had not changed significantly after immigration. Their perception about the impact of food habits on health status revealed positive but low values (3.2 ± 1.3 in a 5 points scale where 5 means lots of influence). The majority of the participants (74%) were non-smokers and only a few (6%) reported suffering from chronic diseases.

Lunch and dinner were the two most frequent meals of Iranians. However, the number of respondents that everyday take lunch and dinner has decreased after immigration. There is more than 10% decrease in the number of people that eat lunch and dinner every day. On the other side we observe that the number of respondents that did not eat morning snack and night snack before immigration has decreased after immigrating to Europe. Therefore, there might be a relationship between reduction in the number

of people who ate lunch and dinner every day after immigrating and those immigrants that have started taking morning and night snack after immigration. Certain aspects of food habits usually stay unchanged during the years, or at least may experience less changes. Asp (1999) believes that the meal patterns, the number of meals eaten during the day and the etiquette of eating are the features that rarely change during the time (Asp, 1999). In contrast, the cooking habits change more easily with several factors, such as immigration, using new kitchen appliances and attending training courses (Asp, 1999). In our research we found that among different aspects of eating patterns, such as meal number, amount of food, meal time, place of eating and type of the food that they eat, the respondents reported highest changes in the type of food.

The Mediterranean diet adherence tool provided a broader perspective on the eating habits of Iranian residents in Europe. About 60.9% of them reported that they are using olive oil as the principal fat for cooking. But when it comes to the question that have to determine the quantity of olive oil they consumed per day, only 11.1% referred a relevant amount. Only 2.2% of the respondents were able to obtain 1 score for consuming wine. Around 65% of them do not drink wine or drink less than 1 glass per week. Different explanations can be done for this condition. Most of Iranians are Muslim and alcoholic drinks are forbidden in Islam. Specifically, in Iran selling and buying alcoholic drinks are officially forbidden. The question with a highest number of respondents (78.3%) complying with Mediterranean pattern was the frequency of eating "vegetables, pasta, rice, or dishes seasoned with sofrito".

Around 16% of the respondents almost never went shopping for food before immigration, however this percentage has reduced to 0.5% after immigration. Due to the fact that most respondents are young (40% below 30 years old), they had been living with their parents before immigration and their parents probably took the responsibility of shopping for foods most of the times.

The average score that the respondents gave to themselves when they were asked to show their agreement with considering their cooking skills as sufficient was 4.34 ± 1.47 (with a scale where 6 was complete agreement). This is more that the average of answering to all 7 questions of the cooking skills scale, which was 3.91 ± 1.22.

In the final analysis, where the impact of different variables on the adherence to the Mediterranean diet and on the changes that they have reported on their eating habits since migration was evaluated, interesting results were obtained. The probability of following a healthy dietary pattern for students, compared to those that had other employment status, was significantly lower. Participants with better cooking skills

were significantly more likely to have healthier dietary pattern.

Duration of living outside Iran also did not influence how the Iranian immigrants judge about the changes that have occurred in their eating habits since migration. Participants with PhD degree have observed less changes in their eating habits since migration, compared to those without university degrees. Comparing to someone without a university degree they were significantly less likely to obtain a score higher than 4 from the change range of 1 to 5. The smokers compared to nonsmokers and former smokers were significantly more likely to report higher changes in their eating habits since migration. We found that the male respondents were less likely to report high changes in their eating habits since migration.

Structure of the meals in Iran is generally quiet Mediterranean. Iranians usually have a standard, simple breakfast. Lunch and dinner are not usually distinguished with each other. However, most of the time they have large lunch and light dinners. Iranian traditional cuisines are prepared by following a set of food rules that are originated from the ancient Greek medicine. Foods are classified as either "hot" or "cold", depending on the food's heating and cooling effect. It does not relate to the foods actual temperature. Iranian cuisine is not widely recognized and is sometimes confused with other Middle Eastern cuisines such as Arab cuisine. It is very common to have a yogurt drink with lunch or dinner. Using dairy products in Iranian cuisine has an old historical background (Foo, 2016).

Eating habits in different regions of the country vary significantly with each other. Iran is usually divided to several regions, such as Northern Iran, Eastern Iran, Southern Iran, Central Iran, Iranian Kurdistan and Iranian Azerbaijan. Each of these regions have their own eating habits and dishes (Foo, 2016).

In Esmaillzadeh and Azadbakht (2008), the Iranian dietary pattern is introduced as a diet high in refined grains, potato, tea, whole grains, hydrogenated fats, legumes and broth. Iranians have high intakes of grains as the main source of energy (Asghari et al., 2012). Most grains that Iranians use are refined type, such as white rice and bread (Esmaillzadeh and Azadbakht, 2008; Asghari et al., 2012). Refined grains and hydrogenated fats are the main feature of dietary intake in Middle Eastern Populations (Asghari et al., 2012).

Low intake of olive oil and olive in Iranian population have been reported in Asghari et al. (2012). We also observed the same situation among the Iranian immigrants in Europe. Only 11.1% of the participants were able to meet the criterion for the amount of olive oil consumed per day in order to receive 1 point, which makes their diets closer

to the Mediterranean diet. The average of the Mediterranean diet adherence score in our study was 6.20 ± 2.15, which is below the average of the 7,447 participants from the Martínez-González et al. (2012) study (8.6 ± 2.0). In our study the mean score of Mediterranean diet adherence for male participants was 0.45 below the mean value for female participants. But in Martínez-González et al. (2012), the mean value for male participants is 0.2 more than the female participants. Another contradicting result that we obtained was the number of male respondents that were at or above 10 points in the 14-item score. In Martínez-González et al. (2012), more men than women were at or above 10 points, but in our study only 39% of the participants that had scores at or above 10 points are male.

Iran is a non-Mediterranean country. However, there are some literature that have studied the proximity of dietary patterns of Iranians to the Mediterranean diet. As in our study, this dietary approach was used as a proxy for an healthy food pattern. Beyzai et al. (2016) aimed to determine the relationship between adherence to Mediterranean style dietary pattern score (MSDPS) with overweight and obesity on female adolescents aged 15-18 years in Tehran. MSDPS was low among adolescent females in Tehran. This is in agreement with what we have found in our survey. MSDPS is used to assess the conformity of an individual's diet to a traditional Mediterranean style diet (Rumawas et al., 2009) and it is said to be appropriate for non-Mediterranean populations. However, this kind of indexes are not quick instruments, they need to be based on detailed dietary evaluation methods. Also no association was found between MSDPS and overweight and obesity. This result is also in agreement with our findings. Changes of BMI in our results did not have significant influence on increasing the chance of belonging to the upper or lower Mediterranean adherence group. In Asghari et al. (2011), the associations between adherence to the Mediterranean diet and obesity and abdominal obesity were evaluated among an adult population in Tehran with an average age of 36.7 ± 12.3 years. The dietary intake was assessed using two 24-h dietary recalls, and all subjects receive scores between 0 to 10 points, based on the modified Mediterranean Diet scale. This study demonstrated that the adherence to the Mediterranean diet had an inverse relationship with BMI. This finding contradicts with our observation among a group of Iranian residents in Europe. We did not find a significant relationship between BMI and the adherence to the Mediterranean diet.

Mahdavi-roshan et al. (2016) assessed the adherence to the Mediterranean diet with the 14-item questionnaire Martínez-González et al. (2012) among a sample of 550 adults, aged $\geq$ 43, who were admitted to a hospital in Rasht, Northern Iran for elective angiography. The mean score of adherence to the Mediterranean diet in men

was 5.9 ± 7.7, which is near to what we obtained in our study (5.97 ± 2.03). The mean score for women was 5.5 ± 1.9, which is below the mean score that we found for female respondents (6.42 ± 2.25).

Silva et al. (2009) analyzed the worldwide trends of adherence to the Mediterranean diet in 1961-65 and 2001-2003 in 41 countries. Based on food balance sheets, the average energy for different food groups was selected to be used to evaluate the adherence to the Mediterranean diet through a variation of Mediterranean Adequacy Index (MAI). The majority of the countries have had a tendency to drift away from Mediterranean diet. Mediterranean Europe and the other Mediterranean countries suffered a significant decrease in their MAI value. In this study, Iran had the highest increase in MAI during the periods, even though the final value of MAI was much lower than those from the Mediterranean countries that have decreased their adherence during the same period. The results of this study do not contradict with the findings of our research. Our study shows that the Iranian immigrant population does not have a high adherence to the Mediterranean dietary pattern, but does not give any information about the improvement of dietary pattern toward a healthier diet, because the study only evaluates one time period. We can't judge with our findings whether they are improving or not.

The average cooking skills scale among the participants in this survey (3.91 ± 1.22) is below the average of a similar study in Switzerland (4.95 ± 1.22 for year 2010) (Hartmann et al., 2013). It is also below the average of a study among university students in Portugal (5.2 ± 1.5) (Santos, 2015). Comparison of average values from the different items of the cooking skills scale in this study and in Hartmann et al. (2013) is illustrated in Table 5.1.

Table 5.1: Comparison of the cooking skills scale of Iranian residents in Europe, 2016 and (Hartmann et al., 2013).

	Food related habits of Iranian residents in Europe, 2016.	**(Hartmann et al., 2013)**
	Mean ± SD	
I consider my cooking skills as sufficient.	4.34 ± 1.47	4.62 ± 1.50
I am able to prepare a hot meal without a recipe.	4.81 ± 1.43	5.23 ± 1.34
I am able to prepare gratin.	3.48 ± 1.73	5.01 ± 1.66
I am able to prepare soup.	4.84 ± 1.43	5.54 ± 1.07
I am able to prepare sauce.	3.96 ± 1.69	5.10 ± 1.49
I am able to bake cake.	3.31 ± 1.93	4.84 ± 1.80
I am able to bake bread.	2.66 ± 1.78	4.18 ± 2.07

The main reason for these difference can be something different with the level of cooking skills of the respondents. Some of the elements in this scale are not very common in Iran. In other words, this scale has been designed for a country with

western diet. For instance, it is difficult and most of the times impossible to bake the Iranian breads at home, the baking process requires specified ovens for bakery. Gratin is also not usually used in Iran, compared to Switzerland. Nevertheless, if the first general item of the scale is considered, the values are not so different.

Furthermore, the positive association that was found between the cooking skills score and how the respondents describe their cooking skills or the level of agreement with knowing their cooking skills sufficient shows that the cooking skills scale is well selected and have the ability to be used as a comparative measure within a population to compare the cooking skills of the sample.

As in most households, it is still the female partner who carries the responsibility of food preparation (Furey et al., 2000), in our questionnaire this aspect has been overlooked and the respondent have filled the questionnaire without indicating whether it is him/her who takes greater responsibility of food preparation in home. However, it was possible to see that the average value for cooking was different for male and female respondents. For female respondents the average cooking skill score was 4.27 $\pm$ 1.15 and for male respondents, it was 3.56 $\pm$ 1.20 (Table 4.1).

One of the limitations of our work was using a convenience sampling, which is a non-probability sampling technique. The subjects were members of selected Facebook groups, friends and friends of friends. This sample was selected because of its convenient accessibility and proximity. This can be an explanation for the short age range of the respondents, because young people and people in middle age have more access to internet and participate more in social media. It is also worth noting that the social media groups, where the questionnaire was posted, were mainly for Iranian students in Europe. However, by this process it was possible to achieve quite a large sample of the young Iranian immigrants.

In addition, in the absence of a more adapted one, a scale developed for an European population was used for evaluating the cooking skills of Iranians. However, an independent general question for self-evaluation of the cooking skills was also included. Although not designed for an Iranian population, the correlation between the values for the whole scale and this independent variable or the first item of the scale (also a general question about considering own cooking skills as sufficient) were positive and strong. This strong association found in the results shows that the scale might represent the cooking skills level within one population.

With this study we were able to capture a complete perspective about the food related habits of Iranian immigrants in Europe with a quite short questionnaire. The average

time that the respondents spent to fill the questionnaire was 21.01 ± 38.05 minutes. To our best knowledge, the food related habits of Iranian residents in Europe have not yet been analyzed in literature, therefore our work is one of the first in this area. Moreover, the studies that have studied the adherence to the Mediterranean diet within Iranians are very limited.

Chapter 6

Conclusions

The results showed that the duration of immigration and the time that the respondents have spent in Europe have not influenced their tendency towards the Mediterranean diet, which was used as proxy for a healthy dietary pattern. It was not more probable for the people who have lived more years in Europe to report higher changes in their eating habits. After assessing the eating habits and food preparation habits of the respondents, few small changes were observed. The immigrants have changed their food shopping pattern, they go to shopping to buy foods more often. The employment status had impact on the adherence of the respondents' dietary pattern to the Mediterranean diet. Students compared to those that were employed, were less probable to belong to the group of participants that had healthier dietary pattern. Academic degree also influenced the changes of eating habits since migration, the respondents with PhD degree were less probable to report higher changes in their eating habits since migration. Gender was also associated with the changes in eating habits since migration. We found that the male respondents were less likely to report higher changes in their eating habits since migration.

The findings of this study demonstrate how the Iranian immigrants in Europe have changed their food related habits. Our findings might be useful to assist dietitians who work with immigrants to become more aware of the elements that impact this group's food choices, and to develop nutrition programs that are more culturally sensitive. The results of this study may be potentially useful for future research and clinical intervention.

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Appendix A

Questionnaire

Food related habits of Iranian residents in Europe

Please reply to this questionnaire that is part of my Master thesis in

Nutrition and Food Sciences at the University of Porto.

It won´t take you more than 15 minutes!

The questionnaire is anonimous and data will only be used for this study purposes.

For any extra information concerning this study, please contact me by email:

faranak.akhavan64@gmail.com

There are 34 questions in this survey

Personal Data

[]Please indicate your GENDER:

Please choose **only one** of the following:

- ○ Female
- ○ Male

[]Please indicate your AGE (for example, if you are 45 years old you should indicate 45):

Neste campo só é possível introduzir números.

Please write your answer here:

[]Please indicate your ACTUAL CITY OF RESIDENCE:

Please write your answer here:

[]How long have you been living in this foreign country (in number of years and months: for example, if you live in Lisbon for one year and an half you should indicate 1 year and 6 month)?

Please write your answer(s) here:

Years

Months

[]

Would you like to stay in this foreign country for the next year?

Reply using a 5 points scale where 1 = Not at all and 5 = Certainly yes

Please choose **only one** of the following:

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

[]

How long have you been living out of Iran (in number of years and months: for example, if you live out of Iran for one year and an half you should indicate 1 year and 6 month) ?

Please write your answer(s) here:

Years

Months

[]Please indicate your COMPLETED EDUCATION:

Please choose **only one** of the following:

- ○ None
- ○ Primary school
- ○ Secondary school
- ○ Bachelor
- ○ Master
- ○ PhD
- ○ Other

[]Which of the following categories best describes your EMPLOYMENT STATUS?

Please choose **only one** of the following:

- ○ Employed
- ○ Unemployed
- ○ Housekeeper
- ○ Student
- ○ Retired
- ○ Other

[]Please indicate your ACTUAL MARITAL STATUS:

Please choose **only one** of the following:

- ○ Single
- ○ Married
- ○ Divorced/Separated
- ○ Widowed

[]

What kind of house do you live in?

Please choose **only one** of the following:

- ○ Entire house/apartment (rented or purchased)
- ○ Shared house or rented room
- ○ Student residence
- ○ Parental housing
- ○ House of other family members
- ○ Other [ ]

[]

With whom do you live?

Please choose **all** that apply:

- ☐ Alone
- ☐ Father/Mother
- ☐ Brothers/Sisters
- ☐ Husband/Wife
- ☐ Other family members
- ☐ Girlfriend/Boyfriend
- ☐ Friends/colleagues
- ☐ Grandparent
- ☐ Children
- ☐ Other: [ ]

Lifestyles and health status

[]

In a typical week, how many days do you practice some kind of PHYSICAL ACTIVITY:

Please choose the appropriate response for each item:

	Never	1	2	3	4	5	6	Every day
Before immigration	○	○	○	○	○	○	○	○
After immigration	○	○	○	○	○	○	○	○

[]

Considering SMOKING HABITS, you are a:

Please choose **only one** of the following:

- ○ Non Smoker
- ○ Former smoker(smoking occasionally)
- ○ Smoker (please say how many cigaretes per day in comment)

Make a comment on your choice here:

[]

In the present, do you suffer from any CRONIC DISEASES (ex: diabetes, hipertension...)?

Please choose **only one** of the following:

- ○ Yes (please identify the diseases as a comment)
- ○ No

Make a comment on your choice here:

[]How has your HEALTH STATUS changed since migration?

Please choose **only one** of the following:

- ○ Has improved
- ○ has not significantly changed
- ○ Has worsened
- ○ I don´t know

[]

Do you think your new food habits have influenced your health status?

Reply using a 5 points scale where 1= little influence and 5 = lots of influence

Please choose **only one** of the following:

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

[]Your actual body WEIGHT (in kilograms) is:

Neste campo só é possível introduzir números.

Please write your answer here:

[]How has your weight changed since migration?

Please choose **only one** of the following:

- ○ Has incresed
- ○ Has not significantly changed
- ○ Has decreased
- ○ I don't know

[]Your actual HEIGHT (in centimeters) is:

Neste campo só é possível introduzir números.

Please write your answer here:

Food habits I

[]

Please indicate the frequency of consuming each meal during a typical week BEFORE and AFTER migration:

Please choose the appropriate response for each item:

	BEFORE migration				AFTER migration			
	Never or less than 1 per week	1-3 per week	4-6 per week	Every day	Never or less than 1 per week	1-3 per week	4-6 per week	Every day
Breakfast	○	○	○	○	○	○	○	○
Morning snack	○	○	○	○	○	○	○	○
Lunch	○	○	○	○	○	○	○	○
Afternoon snack	○	○	○	○	○	○	○	○
Dinner	○	○	○	○	○	○	○	○
Night snack	○	○	○	○	○	○	○	○

[]

In general, how have your eating habit changed since migration?

Reply using a 5 points scale where 1= no change and 5 = lots of change

Please choose **only one** of the following:

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

[]

How the following eating habits have changed since migration?

Reply using a 5 points scale where 1= no change and 5 = lots of change

Please choose the appropriate response for each item:

	1	2	3	4	5
Meal Number	○	○	○	○	○
Mealtimes	○	○	○	○	○
Place of eating	○	○	○	○	○
Type of food	○	○	○	○	○
Amount of food	○	○	○	○	○

[]Describe the changes in meal number and the amount of food :

Please choose the appropriate response for each item:

	Has decreased	Has not significantly changed	Has increased
Meal number	○	○	○
Amount of food	○	○	○

[]

Do you miss some food/dishes from the Iranian culinary?

Please answer using a 5 points scale where 1 = I don't miss at all and 5 = I miss a lot

Please choose **only one** of the following:

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

Food habits II

Please reply to the next questions thinking about your ACTUAL food habits...

[]Do you use olive oil as the principal source of fat for cooking?

Please choose **only one** of the following:

- ○ Yes
- ○ No

[]Consumption per day:

Please choose the appropriate response for each item:

	None/Less than 1	1	2	3	4 or more
How many tablespoons of olive oil do you consume per day (including that used in frying, salads, meals eaten away from home, etc)?	○	○	○	○	○
How many servings of vegetables do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	○	○	○	○	○
How many fruit units (including fresh squeezed fruit juices) do you consume per day? (ex: 1 fruit unit is 1 slice of melon or pineapple; 1 whole apple or banana; 2 whole plums or kiwi fruits; 1 cupful of raspberries or grapes)	○	○	○	○	○
How many servings of red meat, hamburger, or meat products (ham, sausage, etc.) do you consume per day? (1 serving: 100–150 g)	○	○	○	○	○
How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	○	○	○	○	○
How many cups of sweet or carbonated beverages do you drink per day? (1 cup: 100 ml)	○	○	○	○	○

[]

Consumption per week:

Please choose the appropriate response for each item:

	None or Less than 1	1	2	3	4	5	6	7 or more
How many cups of wine do you drink per week? (1 cup: 100ml)	○	○	○	○	○	○	○	○
How many servings of legumes (ex: red beans, peas, fava beans, chick-peas) do you consume per week? (1 serving: 150 g)	○	○	○	○	○	○	○	○
How many servings of fish or shellfish do you consume per week? (1 serving: 100–150 g of fish or 4–5 units or 200 g of shellfish)	○	○	○	○	○	○	○	○
How many times do you consume commercial sweets or pastries (not homemade), such cookies or cake per week?	○	○	○	○	○	○	○	○
How many servings of nuts (including peanuts) do you consume per week? (1 serving: 30 g)	○	○	○	○	○	○	○	○
How many times per week do you consume boiled vegetables, pasta, rice, or other dishes with a sauce of tomato, garlic, onion, or leeks (تره فرنگی) sautéed in olive oil?	○	○	○	○	○	○	○	○

[]

Do you prefer to eat chicken, turkey or rabbit instead of beef, pork, hamburgers, or sausages?

Please choose **only one** of the following:

- ○ Yes
- ○ No

Food preaparation

[]

How do you describe your cooking skills?

Reply using a 6 points scale where 1= very bad and 6= very good

Please choose **only one** of the following:

- ○ 1 Very bad
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6 Very good

[]How often do you cook?

Please choose the appropriate response for each item:

	Never	Less than once per month	1 to 3 times per month	1 to 3 times per week	4 to 6 times per week	Everyday or more than once per day
Before migration	○	○	○	○	○	○
After migration	○	○	○	○	○	○

[]How often do you do the shopping for your food needs?

Please choose the appropriate response for each item:

	Never	Less than once per month	1 to 3 times per month	1 to 3 times per week	4 to 6 times per week	Every day or more than once per day
Before migration	○	○	○	○	○	○
After migration	○	○	○	○	○	○

[]What was the most relevant source for you when you were learning how to cook?

Please choose **only one** of the following:

- ○ Alone
- ○ Mom
- ○ Grandmother
- ○ Dad
- ○ Friends
- ○ TV Shows
- ○ Internet websites
- ○ Books/Magazines
- ○ Cooking courses
- ○ Other [ ]

[]

Please indicate the degree of agreement with each of the following phrases...

Reply using a 6 points scale where 1 = strongly disagree and 6 = completely agree

Please choose the appropriate response for each item:

	1 Do not agree at all	2	3	4	5	6 Totally agree
I consider my cooking skills as sufficient.	○	○	○	○	○	○
I am able to prepare a hot meal without a recipe.	○	○	○	○	○	○
I am able to prepare gratin.	○	○	○	○	○	○
I am able to prepare soup.	○	○	○	○	○	○
I am able to prepare sauce.	○	○	○	○	○	○
I am able to bake cake.	○	○	○	○	○	○
I am able to bake bread.	○	○	○	○	○	○

Study continuation...

[]Please leave your email contact, if you are available to participate in a second phase of this study (consisted of an extra questionnaire on the same issues)...

Please write your answer here: